# The Builder.

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### *Trees and Shrubs in Towns.*

THE protest against the proposal to widen Piccadilly was noticeable, among other points, for the regard which was expressed by many persons for the preservation of the trees on the south side of Piccadilly. These particular trees are of no great individual importance, and the affection, one may almost say, with which many of the public regard them appears somewhat exaggerated in view of the neglect and indifference in regard to trees and shrubs in many parts of the Metropolis and in many towns and urban districts all over England. For if the Piccadilly trees are well worthy of preservation—as we believe they are—why do not the public interest themselves more in urging on Local Authorities to increase the number and to show greater care of trees which are already in existence? That there should be this feeling for the Piccadilly trees is not surprising when we remember how country-loving a person the average Englishman is, and how much he prizes a day out of town. But that fact only increases the surprise that more is not done towards beautifying towns by trees, shrubs, and flowers. For undoubtedly nothing does more to increase the charm of cities than the bringing into them as much of the country as is possible, as much of the colour and variety of Nature as is compatible with the artificiality of a town. Yet when we look round London, or indeed any other English town, it is impossible not to be struck with the lost opportunities. We congratulate ourselves on Kensington Gardens and on our parks, sometimes on our squares, but nevertheless there is a conspicuous want of system in the enlargement of Nature in towns. What is done is done too often spasmodically, or is the result rather of individual effort than of corporate determination. Thus it is understood that Sir J. Wolfe Barry has induced the Westminster Town Council to consider the desirability of planting trees in Whitehall and Parliament-street. Here we have probably the result of individual effort in regard to a particular thoroughfare. But, by way of example, let us suppose Parliament-street and Whitehall planted with trees. At the top of this thoroughfare we arrive at Trafalgar-square, which long ago might have been made infinitely more attractive by systematic planting of trees; room for beds of shrubs and of flowers might also have been found, bringing colour and beauty into a singularly bare space. Let us follow our walk, and we come to Waterloo-place, the portion of which between the Guards' Memorial and the Duke of York's Column might long ago have been a mass of greenery—an offshoot, as it were, of the Mall and of St. James's Park. Portland-place, again—we take only some of the most obvious instances—stands a perpetual reminder of the neglect which is apparent in London of the opportunities of beautifying it systematically, of making the most of the opportunities which occur. What is needed is not irregular individual effort, but a combined and continuous determination by Local Authorities to make the most of such spaces as are capable of supporting the growth either of trees, flowers, or shrubs. A tree once planted will take care of itself. Artificial lopping of limbs such as has disfigured the planes on the Embankment is greatly to be deprecated. In regard to these particular trees, we would urge on the Authorities the necessity during the coming winter of completing the thinning of these trees by the removal of every other tree, as has been done at the west end of the Embankment. The dwarfed intermediate trees overpowered by their fellows ought never to have been planted at all, and ought to be removed as soon as possible.

But, apart from trees, a great deal more might be done with shrubs, which need less space than timber trees. In this respect, almost every square in London is an example of lost opportunities. Perhaps the most glaring example is St. James's-square, which is surrounded with a dense and ugly thicket of lilac, which never flowers, and which hides the picturesque timber and green sward in the centre. It is high time, indeed, that St. James's-square was handed over to the Local Authority for public use. It has ceased almost entirely to be a residential square; but if these bushes were removed and it were made a public place, it would be used as an agreeable lounge by many from the whole district around, and it could be made bright with flowers, as parts of St. James's Park now are. Indeed, if we examine the London squares, nothing is more noticeable than the want of colour. Of course, brilliant flowers will not flourish under spreading trees, but there are plenty of openings and spaces which a skilful gardener would utilise. But, taking them as a whole, nothing whatever is done. It would be easy to find places in every square in London where a tub of agapanthus could be placed in the summer, the striking blue flowers of which are in bloom from July to September, and which needs only to be removed to an outhouse or cellar in the winter. We give this as one instance only, but any one acquainted with flowers and shrubs can find in every square in London lost opportunities, more especially in regard to coloured shrubs. Where are the purple Prunus Pissardi, the most hardy of shrubs, the variegated maples, the various species of berberis, the golden yew, and others of equal beauty, to be seen in London?

So far as squares are concerned, this neglect of opportunities is quite remarkable, for many of the householders who have an actual interest in the square gardens are lovers of flowers, and sometimes possess country houses. Yet they are satisfied to allow the square gardens to be treated with neglect in an age when booksellers' shops are filled with works on gardens and on flowers, and when every publisher has one or more works on this subject on his list. Why some of these good people who are constantly giving us their experiences of Surrey gardens, or a year's work here or there, do not endeavour to improve the appearance of London horticulturally is really astonishing. There is the dreary courtyard of Burlington House; the centre might quite well have a small fountain filled with lilies, and around it a little plot of green with some well-tended shrubs and bright flowers. Instances multiply themselves on every hand. London can architecturally never hope to compete with cities such as Paris or Berlin, but, retaining those particular characteristics which give it a unique charm, it might become even more beautiful were the authorities and inhabitants to make up their minds not only to utilise every space which is available for the growth of trees, flowers, and shrubs, but to have them tended

not only with care, but also with intelligence. Every Local Authority, as well as the Office of Works, might have an advisory committee of specialists to suggest and to report not only on desirable horticultural improvements, but on the management of existing trees, shrubs, and flowers. Some disappointment in homes there must be with trees and shrubs, since the atmosphere of the Metropolis is certainly injurious to many plants. But we have only to look at Kensington Gardens, St. James's Park, and Regent's Park to see what is possible of accomplishment, for on a smaller scale everything that is carried out in those places is possible in any London square. And even in these parks the horticulturist is constantly struck with opportunities not seized and with the absence of new shrubs. But when he leaves them he is generally thankful that the cultivation of trees, and flowers, and shrubs is as satisfactory in these places as it is, when he perceives the complete absence of colour in many parts of London, where summer and winter are alike unmarked by the beauty of plant life.

## THE ARCHITECTURAL TREATMENT OF BRIDGES.

By the Editor.

THE illustrations in this issue of the *Builder* are all of bridge designs —two by architects and one by an engineer; and have been purposely combined in one issue in order to afford an opportunity for a few words in regard to the treatment of bridges from an architectural point of view; in other words, the degree and the manner in which, after the purely structural requirements have been worked out, a bridge may be further regarded and treated as a work of art, susceptible of architectural effect and embellishment.

The subject has been brought prominently into notice recently, firstly by the peculiarly unfortunate æsthetic mistakes which were made in the case of the Tower Bridge, and which have converted what might have been a grand and effective structure into a piece of architectural gimcrack; secondly, by the controversy which arose in regard to the exceedingly awkward and ill-conceived architectural design proposed by the Engineer of the London County Council for the granite facing of Vauxhall Bridge; thirdly, and in a much more agreeable and satisfactory manner, by the admirable paper read by Mr. J. Husband before the Institution of Civil Engineers, in March of this year, on "The Æsthetic Treatment of Bridge Structures;" a paper which, though one may not agree in detail with all the views expressed in it, can only be regarded as an honour to the author of it and to the Institution of which he is an Associate member, and which has certainly tended to definitely advance the study of the subject. Moreover, the association of a good many architects, kindly invited by the Institution, in the discussion of the paper, has we may hope done something to break down the wall of partition or misunderstanding between engineers and architects, and to convince the former that architects really have something to say on the subject, and some right to a *locus standi* in connexion with it; and it is probable that we shall not again hear indignant complaints from engineers that the proposal to associate an architect with them in the design of a large bridge is of the nature of an insult to them. Indeed, it would seem that even the stubborn hearts of the London County Council have been somewhat melted within them on this point; for while they have persistently refused to call in the aid of an architect in the treatment of Vauxhall Bridge, on the futile and illogical ground aforesaid, that it would hurt the feelings of their engineer (a consideration which they apparently put before the proper carrying out of a great public work), it seems to be pretty well understood that on the next occasion of the kind the assistance of an architect will be sought—at all events where it is intended to develop a bridge beyond the phase of bare constructional requirements, in which case alone the work gets out of the proper province of the engineer.

The question, however, where does engineering end and architecture begin, in the case of a bridge—and the correlated question, where is the line of demarcation between the province of the engineer and the architect, is not such a very easy one to settle; it seems indeed to call for a kind of æsthetic application, if one may so say, of differential calculus. The words "architectural effect *or* embellishment," a few lines above, were not used without purpose. There may be architectural effect without any embellishment; effect arising solely out of line and mass, and in which decoration has little or no place; such effect as we see in London Bridge for instance, and in some of the plainer and sterner examples of Norman and Transitional architecture. In the case of a built bridge of stone or granite, this effect may be arrived at without going beyond the best structural requirement; in other words, without going out of the engineer's province. The best lines of structure, in such a case, will often produce also the best effect. As soon as the element of embellishment or decoration comes in, however, we are purely in the architect's province. An engineer's education does nothing for him in training the eye and taste in architectural decoration; his faculty of design, in the artistic sense, has never been cultivated, and the probability is that he appropriates stock features out of architectural books, treats them clumsily and misapplies them so as to be absurd and unmeaning. On the other hand, if we go back to the early stages of the structure—the preparation of the foundations in deep water, it is equally certain that here we are on ground which is peculiarly the engineer's, and for which the usual education and experience of the architect have not prepared him. We may say, then, that there are three stages in bridge building on a large scale and in a sumptuous manner: the preparation of the foundations and the inner structure of the piers, which is purely engieeering work; the decorative embellishment, which is purely architectural work; and an intermediate stage which, according to circumstances, might be handled either by engineer or architect, but which (we may add) will be in general the better for the collaboration of the two.

The case of the Vauxhall Bridge affords an apt illustration of this latter point. In this case the wide flat segmental arch, starting abruptly from the piers and as if jammed between them, has anything but a good effect. But we are told that these lines are almost absolutely settled by practical conditions. The piers were, by the requirements of the Thames Conservancy, to have so much waterway between them; the crown of the arch was to give so much headway above the water level: on the other hand, by the requirements of the shore authority (the County Council) the gradient of the roadway was limited to a certain minimum of rise. Obviously under such conditions there is very little margin left to the constructor, and it is not surprising that a steel bridge was at first proposed as the only solution. There was a considerable public feeling, however, in favour of a granite bridge; but no engineer, or architect either, would have recommended the erection of an arched masonry bridge of so great a span on such flat lines. Then came the *via media* of a concrete arch, so-called, which is really rather a couple of huge cantilevers than an arch; which can be safely constructed on the lines required by the authorities, and which could be faced with granite so as to give the effect of a monumental bridge of that material. This was apparently quite satisfactory to the County Council's engineer; but from an architect's point of view the result is this, that an apparently granite arched bridge is designed on lines which would not be employed if it were really of that construction, and of which consequently the effect is unsatisfactory to the eye. And here comes in the point at which the presence and influence of an architect in this intermediate stage would have been of value. In the first place, an architectural coadjutor would never have passed or permitted such clumsy and vulgar details as were shown in the engineer's design (whether or how far they are to be modified in accordance with the criticisms that have been passed on them I know not); in the second place, he would certainly have put the question whether these lines and proportions of construction proposed were really so necessary and inevitable as was pretended. Engineers wanting to build ugly things are so fond of professing that whether you like it or not, they cannot help it; that the proportions are fixed by circumstances or authority; and so on. An architectural adviser could and probably would have put the question —is it really necessary to have so wide a span between the piers, spoiling the proportions of the bridge by so flat an arch? Is not this extreme width a somewhat imaginary necessity, and is it not worth while to give up something of space for the sake of a finer structure? An argument of that kind, strongly pressed, might perhaps have been met by a relaxation of the conditions which are supposed to have been so imperative, and by an admission that something must be conceded on both sides; but there was no one to do it. Did such a case occur in France, the architect commissioned along with the engineer would almost certainly have put that argument; and what is more, *he would have been listened to.* In France such considerations have weight. In England it is a fixed idea, in regard to engineering structures, that the practical considerations are everything, and that no argument in regard to architectural appearance is of any consequence at all.

Thus it comes about that we are having a bridge erected which, while on the face of it it is to appear as a masonry structure, is not

structurally such, and is designed on lines which, on so large a scale, are unsuitable and insecure-looking for such an apparent structure. Regarded as such, it is too flat in its lines and too weak in its crown. No treatment could really make it satisfactory. What is suggested in the design published in this issue is such a treatment as would minimise the appearance of weight in the masonry, and give the greatest possible apparent depth in the crown. The manner in which this has been arrived at is pointed out more in detail in the explanatory article under the head of "Illustrations," and need not be recapitulated here. What is important to note, however, is that if the system of concrete hinged arches, or cantilevers, with a granite facing, is to be accepted as a favoured form of bridge-building in the future, it is necessary that a treatment of facing granite should be adopted suitable and expressive of the circumstances, and totally distinct from that which is suitable when the bridge is really a monumental and homogenous structure of stone or granite. In the latter case, the more powerful and massive the face design is the better, as in the fine examples of London Bridge and Waterloo Bridge. In the former case, a lighter and perfectly different treatment is required, to express the true function of a facing which is a *revêtement* and not an essential element of the construction.

It would be worth while, perhaps, to take into consideration the possibility of a satisfactory surface treatment of the concrete itself, without any masonry facing; and let a concrete bridge, if that construction be decided upon, appear frankly as such, with a cement treatment on the face of it. Such a bridge could never have the imposing appearance of a masonry bridge, and it is not likely it would ever be adopted except where circumstances of site or a rigid necessity for economy demanded it; but there would be a certain merit in frankly accepting the concrete bridge and making the best of it.

Coming back to solid granite or masonry bridges, however, which after all are likely to keep the field more or less (for they certainly make the finest and most monumental class of bridge structures), the points which seem most to require attention are the face of the main piers, and the spandrels of the arches. There has been a great prevalence of the use of columnar orders on the face of the piers, in the shape of engaged columns or pilasters. This is really a misuse of such a feature, as Mr. Husband did not fail to point out in his paper. There has been a feeling that something must be done at that point in the way of architectural or decorative treatment, and the column has been seized upon, as it has in many more purely architectural structures, because *something* is wanted, and that is a historic feature which comes readiest to hand. Rennie avoided it in London Bridge, but adopted it in Waterloo Bridge; and it must be admitted that there is something very fine in those great, plain, severe columns which stand in couples on the Waterloo piers. Architectural logic, however, must rule that they are out of place there, even more than on the screen wall of a building. The pier has to have the effect of lateral strength; there is nothing of any consequence to support above it; and a feature which expresses resistance to vertical weight is out of place. What we want is something of the suggestion of a buttressing mass; not applied to the face of the pier, but resulting from the shape and design of the pier itself. This is what is attempted, in a new form, in the study published in this issue.

Then, in a bridge on a large scale, the spandrels of the arch offer a considerable space which may or may not be specially treated. Panelling, as noted by Mr. Husband, has been resorted to, but it is a weak expedient, and suggestive of a structure other than masonic. In a bridge of a severe type, perhaps nothing is better than to leave the lines of the masonry, more or less emphasised by rustication. If it is desired to fill in or diversify this blank space, it would seem that here we may rightly apply something of the nature of a surface decoration; either a bas-relief where the bridge is a comparatively small one, or a heraldic device, or a bust in a medallion. It depends to some extent on the amount of decorative treatment admitted in other portions of the bridge, whether we should leave the spandrels as plain masonry, or relieve the space with a decorative feature. In the case of the design published in this issue, where the voussoir lines (for a reason noted under the head of "Illustrations") are carried up to the corbel-table under the balustrade, the longer lines in the haunches of the arch are too insistent and require something to break them; hence the heraldic escutcheons and wreaths, æsthetically of the nature of an applied ornament, but of course in reality carved out of projections left in the solid stone. In this case the spandrel, in the usual sense, has disappeared; the facing is, so to speak, all voussoir, and the decoration does not follow but breaks their lines. So it would be also in the case of a bridge with spandrels of masonry in horizontal or nearly horizontal courses, above a strongly marked system of voussoirs.

Then there is the question of a cornice. Here again we should recognise a distinction between the solid and veritable masonry bridge, and the bridge which is a concrete structure with a mere facing of masonry. In this latter case a heavy cornice of great projection is out of place; it is emphasising too much and placing too much weight on what is only a decorative facing. But in a solid masonry bridge a powerful cornice is a fine source of effect; only, in introducing it, we must remember that we are not dealing, as in an ordinary building, with a true horizontal line; unless in such a case as Waterloo Bridge, where the approach is artificially built up (on the south side) in order to leave the bridge its unbroken horizontal line. This produces a grand effect as far as the bridge itself is concerned, but it was hardly justifiable to deliberately construct a heavy gradient approach in order to obtain the effect, and it is not a process likely to be repeated. Where the bank level is not very high, and a certain minimum of headway is required above the water level, a bridge will always have to assume a certain degree of slope and curvature of line on either side of the crown. In that case the cornice becomes a raking cornice, and it is essential that it should be stopped by the piers, not made to break round them, because such a break cannot be properly constructed; either the cornice must rake round the vertical feature (whatever it is) of the pier, which has the worst possible effect, or it must stop on the further side and begin again at a slightly lower level; an arrangement which cannot be worked at all. That was one of the worst faults of detail in the engineer's original design for Vauxhall Bridge, published in our plates a year or two ago; the large cornice was supposed to be carried in a continuous line round a great circular column on the pier, and resumed on the other side. Such an arrangement could only be worked by "fudging" the mouldings.

One of the besetting sins in the treatment of bridges is to entertain the idea of harmonising them with the environment by adopting some kind of feature belonging to another age; as in the case of the Tower Bridge, which was "Gothicked" (after a fashion), from an absurd idea that this was necessary in order to harmonise it with the neighbourhood of the Tower. It is to be feared that the right lesson in this respect is still unlearned, for one has heard threats that the new Lambeth Bridge is to be made Gothic, to "harmonise" with the Houses of Parliament. Hamerton pointed out the fallacy of this idea in the case of the Conway tubular bridge, where the towers were battlemented in consequence of the proximity of Conway Castle; and Mr. Husband, in replying to the discussion which followed his paper, rather defended this on the ground that there were circumstances in which bridges might be required to be fortified. Very well; in that case fortify them in a modern manner, by a revolving turret or an earth bastion with a disappearing gun; but do not suggest, in a modern bridge approach, a mode of fortification which is centuries out of date. Tricks of this kind only spoil a design. Mr. Husband rightly praised the general design of the Grünenthal bridge, which formed one of the illustrations to his paper; but that bridge, a very fine and picturesque example of modern steel structure, is spoiled by its absurd castellated towers at each end, which look as if they had come out of a toy box of bricks.

In the case of steel bridges attempts at ornamentation have hitherto almost always been bad, and are moreover little required if the lines of the structure itself are good. If they are, it will be a gratification to the eye; if they are not, gilding and rosettes and ornamental rivet heads, and such gauds, will only make it worse. Good lines of structure in steel work, candidly shown, can never be offensive to the taste, and render the structure an object of interest at all events to those who understand construction. Nearly all the valid objections that architects and artists often make to the works of engineers' steel structures arise not on account of the structure, but on account of the ill-judged attempts to make it what is called "ornamental." In this respect the small bridge at Breamore, designed by the County Surveyor of Hampshire, and illustrated in this issue, is a very good example of the sensible and unaffected treatment of a work of this kind. The work is perfectly plain; the only bit of what may be called ornamental treatment in it, the scroll terminations to the stiffeners, gives them some additional strength and is a natural and suitable way of treating the extremities of a piece of steel in this position. The brick piers are quite unadorned

and merely serve their constructive purpose. But there is nothing here that is in bad taste; it is a perfectly satisfactory piece of work, and a good example, though on a small scale, of the right spirit in which to treat steel bridge structures.

## NOTES.

The Co-operation of Architects and Engineers.

Within the last few years the increasing application of machinery and engineering appliances in buildings of all kinds—to say nothing of structural steelwork—has added considerably to the responsibilities of the architect. Sooner or later serious attention must, undoubtedly, be devoted to this matter, for it cannot be said that its present position is at all satisfactory. On every hand we find that private houses, blocks of flats, office buildings, warehouses and public institutions of various kinds are being erected and equipped, under the direction of architects, with electrical and mechanical appliances and machinery, the design and installation of which properly demands years of training and practical experience. Very few architects claim the possession of these qualifications, yet it is rare to find any who decline to undertake such work. Sometimes a consulting engineer is called in to advise the architect privately, but, as a general rule, the manufacturing or contracting engineer has the privilege of furnishing technical information, not only without payment, but without any assurance that he will secure the work in question. It would be unreasonable to blame architects for this state of things, as we believe clients to be entirely at fault. They expect the architect to be a sort of universal expert, and are not willing to run the risk of paying for co-operative advice and superintendence. A similar condition has already evidenced itself in the United States, and has been under consideration by the American Institute of Architects. In a report made by that body, after a conference with a Committee of the American Society of Heating and Ventilating Engineers, and engineers interested in various specialties, the recommendation was made that the scheduled charges of the Institute should be so amended that the minimum fee of the architect for those parts of the work involving electrical, mechanical, and sanitary engineering, heating and ventilation, should be 10 per cent. of the cost, and that the architect should select engineering experts who should render their services under his supervision. An arrangement of this kind appears to provide reasonably for the interests and the co-operation of both professions, and the advisability of similar action might well be considered by our own Institute in conjunction with the leading engineering institutions.

American Institute of Architects.

The thirty-fifth annual convention of the American Institute was announced to be opened this week at Buffalo, New York State, on the 3rd, 4th, and 5th inst. The Reports of a number of Standing Committees form a large portion of the business. Friday was to be entirely occupied by a series of papers in reference to the Pan-American and other Exhibitions (or "Expositions," as the Americans prefer to call them, we suppose because "exposition" is the French word), with the object of considering the best manner of arranging and designing such exhibitions, and providing for lighting, decorative effect, &c. In the main the subjects discussed seem hardly to be of the usual interest from the higher architectural point of view.

St. Séverin, Paris.

It is sometimes noticeable that while the French give much thought to the propriety of new buildings, they are not always so careful as they might be to make the most of ancient buildings. It is satisfactory, therefore, to note the clearance of the miserable houses which have obscured the east end of the Church of St. Séverin in Paris. Already a space at the south corner is cleared, and it is interesting to see how at some period—not, perhaps, so very remote—domestic buildings of the most common kind and apparently of the most temporary description have been fastened against the church, shutting out the windows and the whole of the east end. It is very much to be desired in the interests of architecture that a clearance should be made of the domestic buildings which are to be found attached to cathedrals and churches in many of the French provincial towns, for it has to be borne in mind that they are constantly a source of danger by fire. However, we may be thankful when a clearance takes place as in the case of St. Séverin. Not that the space around should be so large as to give churches the appearance of mere monuments, for it is far more suggestive to find buildings in the position in which their builders intended they should be. But houses built against the church windows are obviously a pure barbarity.

Sanitary Aid Committees.

The creation of a voluntary association in Birmingham, under the name of the "Sanitary Aid Committee," appears to be in many ways more important to the country generally than to Birmingham, which has always had a foremost place in active municipal life. This committee appears to have as its object to act as a kind of independent aid to the regular sanitary authority, and to enlighten the community in regard to sanitary matters. Persons of common aims, working together, can do much more than by individual action, and if in other districts a few persons interested in the improvement of sanitation were to combine they could effect much. There is, in the first place, the necessity of calling the attention of sanitary authorities to the performance of their duties. There are various associations in existence for the protection of commons and rights of way. Where one of these bodies finds an assumed right of way interrupted it brings the matter before the proper authority, and any number of public rights have been thus preserved. The same kind of action in regard to sanitary matters both in towns and in rural districts might have equally valuable results. Good work could also be accomplished by the spread of information, the giving of lectures in schools and in clubs. Altogether we hope that in other places besides Birmingham Sanitary Aid Committees will be established.

Sewage Purification in Manchester.

A recent Report of the Rivers Committee of the Manchester Corporation was discussed at the meeting of the Council last week. The discussion is interesting as showing what use is already being made of the last Report on sewage-purification issued by the London County Council. About two months ago we pointed out the unsatisfactory nature of the processes and apparatus adopted in these tests, and our view was confirmed a week later by Mr. Scott-Moncrieff, but one of the Manchester Councillors has evidently accepted the conclusions of this Report as entirely applicable to any and every process of bacterial purification, and quoted them in proof of his statement that "to attempt to treat sewage by the bacteriological system without the use of chemicals would be an absolute failure." Dr. Dreyfus, the vice-chairman of the Committee, characterised the statement as "false," but, at the request of the Lord Mayor, withdrew this unparliamentary adjective and substituted the words "most inaccurate." Of course, no one goes so far as to say that bacteriolysis effects an absolute purification of sewage in the short time which can be allowed in the treatment of sewage, but even such a statement would be less erroneous than a wholesale condemation of the process.

Petrified Oak in Russia.

A correspondent sends us an interesting account of some remarkable deposits of petrified wood existing in one of the rivers of South Russia. The deposit consists of a quantity of calcined oak lying in the bed of the river in layers three or four deep, and extending over an area of some 150 miles. A main feature—which, indeed, constitutes the chief value of this specific hardwood—is its variety of colours. No fewer than twelve shades in pink, blue, yellow, and that known as American walnut have been found. This peculiar formation would seem to have been caused by the variegated character of the soil at the bottom of the river. How long Nature has taken to achieve this feat is a question to be solved by geologists. Some six years back a Russian timber merchant purchased a twelve years' lease of the deposits and determined to exploit them. During the six years of his tenancy, already expired, he has nearly doubled the sum of his original outlay, and this with only very primitive methods of exploitation, viz., manual labour with boat-hooks. The excavated timber is in logs of from 42 ft. to 200 ft. in length by 15 in. to 20 in. in diameter, and each log is of one uniform shade throughout. The transit to St. Petersburg or Riga from the locality of the deposit is comparatively cheap, viâ Russia's main waterway, the river Volga, and the present leaseholder estimates the deposit as being still capable of yielding from 150,000 to 200,000 good, sound logs of an average length of 70 ft. In the face of the present controversy on the relative values of American timber compared with Australian hardwoods for certain purposes, it would be interesting to know the opinion of the trade upon this Russian deposit of hardwood. It would be still more interesting, from a geological standpoint, to discover whether similar deposits have been known to exist in other parts of the world. That the hardwood may be turned to practical use is evident from the experience of the above-mentioned trader.

The Capetown Cathedral.

In a recent issue *South Africa* publishes the ground plan of the intended cathedral at Capetown (the foundation-stone of which was

laid in August by the Duke of Cornwall), and gives some particulars but not the name of the architect. From the plan, the building is evidently intended to be Gothic in character. On the south side of the plan there is a cloister court, not however against the south wall of the nave, but (as at Chichester) abutting against nave and choir walls, and enclosing the front of the south transept as one side of the cloister garth. The modern uses of the cathedral are indicated in the titles of the rooms opening out of the cloister, which consist of classrooms, cloakrooms, lavatories and offices. All this appears to us quite in accordance with the principle of rendering the cathedral of practical use for its neighbourhood, though we suppose some ecclesiologists will be shocked at what they will consider a kind of profaning of the sacred precinct. The chapter-house, rectangular in form, opens at the east end of the south cloister walk. It is intended, if possible, to use entirely stone found in the colony, in the erection of the building. Table Mountain sandstone is proposed for the exterior; and for the interior, stone from Stormberg, Steenpan, or Bulawayo, the last-named being said to be the best stone in the colony.

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Holy Trinity New Church, Kensington.

We understand that Mr. G. F. Bodley has been appointed architect of the new church which, together with a parsonage house, is about to be built in Prince Consort-road, South Kensington, upon a site (in the parish of St. Stephen) which the Commissioners for the Exhibition of 1851 offered for sale. To the cost of the new church will be applied the proceeds of the sale of the site and materials of Holy Trinity Church, Park-side, Knightsbridge, built in 1860-1 by Messrs. Dove Brothers, at a cost of 3,250*l.*, from the designs of R. Brandon and H. M. Eyton, and illustrated in the *Builder* of April 21, 1860. A scheme recently made by the Ecclesiastical Commissioners provides for a union of the two contiguous benefices of All Saints' and Holy Trinity, Knightsbridge, and for the demolition of the church of the latter vicarage. The Commissioners ordain that the united benefice shall be served by All Saints' Church, which was erected fifty years ago (and subsequently enlarged) in Ennismore Gardens from the designs of Lewis Vulliamy. The interior was decorated by Owen Jones.

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No. 19, Old Jewry.

A few days ago the National Debt Commissioners removed their offices to Finsbury Pavement House from No. 19, Old Jewry, and the demolition of their former premises in Old Jewry is now in progress for a rebuilding by Messrs. W. Cubitt & Co. The house was designed by Soane in 1818-9, for purposes of the National Debt Redemption and Life Annuities business, and completed the block for which Soane had designed in 1808-10 the five houses known as New Bank - buildings* in Prince's-street, which he widened and straightened, taking some of the recovered ground for his enlargement of the Bank of England. In the Soane Museum is preserved a set of plans signed by him, and entitled "The Five Houses in Prince's-street called 'New Bank Buildings,' erected 1807-10 upon ground recently bought by the Bank of England." The ground was acquired from the Grocers' Company, who received 20,000*l.* as compensation. In the same collection are some sets of varying designs for the complementary premises—No. 19, Old Jewry. On the ground floor of the National Debt Offices was a large open chamber, lighted by a drum and cupola carried upon four arches, which Soane designates as the "cenotaph and place for paying English and Irish Tontines," and especially designed for Westmacott's seated statue of William Pitt, a gift of the Bank Directorate to the National Debt Commissioners: a wooden model of the "cenotaph" is in the Soane Museum. The plans we mention show the sites of the Grocers' (old) Hall and garden; and of the old Meeting House, Meeting House (formerly Windmill) court, and almshouses in Old Jewry. No. 19 and the open space in the rear occupy the site of the almshouses, the Meeting House, and three other messuages, which together constituted the Morys trust property as sold for 10,000*l.* to the Governors and Company of the Bank of England by the Armourers' Company. Soane also designed (1811) Thellussons' banking-house in Meeting House-court. The almshouses, now quite forgotten, had been founded there with a bequest in 1551 to the Armourers and Braziers from Dame Elizabeth Morys of all her lands and tenements in St. Olave, Jewry, parish under charitable trusts. Mr. A. C. Blomfield's designs for the rebuilding of Bank-buildings were at the Royal Academy Exhibition of the current year.

* Not to be confused with (old) Bank-buildings, built after Sir Robert Taylor's designs and pulled down in 1843, which stood at the west end of Threadneedle-street, south side.

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The word "Renaissance."

We observe that the printed prospectus of lectures on architecture and construction at University College contains the announcement of a course of lectures on the architecture of the "Rénaissance." It is not a misprint, for it recurs six times in the paragraph. Of course it is generally understood that University College is an institution for instruction in science rather than in literature; but still we should have hoped that some one connected with the issue of the prospectuses would have been aware that there is no accent over the first syllable of "Renaissance." Such mistakes do not look well in the printed circulars of an important teaching body.

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## SOME PRIMARY CAUSES OF EXPANSION AND CONTRACTION IN PORTLAND CEMENT CONCRETES AND MORTARS.

By H. Howard Humphreys, A.M.Inst.C.E.

The extraordinary "boom" which set in some five or six years ago in the building trades, for which the buoyant commercial condition consequent upon prolonged peace amongst the great manufacturing nations of Europe was chiefly, though not entirely, responsible, has had a curious, and to some extent a paradoxical, effect on the general use of Portland cement. The cause of the boom in this country was doubtless materially assisted by the fact that several large engineering and building works had started about the same time, and an artificial scarcity of cement was created, with the usual result that the price of the material was very shortly inversely as the supply. Then appeared the paradox; for as soon as the fact had been carefully advertised that manufacturers could not cope with the demands made upon their works by consumers, many engineers and architects who had hitherto taken little notice of cement began to attribute an excellence to it, as a constructional material, to which they had previously been blind, and to specify it where they had formerly used either hydraulic or common lime. An internal boom, due to what may be called secondary excitation, therefore occurred, and this at the present time is largely responsible for the fact that the storage sheds of the best manufacturers show but little stock.

Deplorable as are some of the transient fashions of the building trades, in this particular instance the supersession of the feebly hydraulic limes by Portland cement makes wholly for good, as it assists constructional men in arriving at the goals of stability and durability. Unfortunately, however, cement is a highly complex and apparently capricious material, which sometimes develops disintegration where cohesion was reasonably expected, and disgusts those who would have been its best friends were it more constant in its attachment. This is especially so in the matter of its volume, which certainly should be permanent, except so far as regards expansion and contraction due to atmospheric causes, and which it is extremely difficult, if not impossible, to entirely neutralise. It is obvious that if concrete or mortar expands after taking its initial set it will cause movement and distortion, destroying the homogeneity of the structure upon which it has been used, or, in the case of floors, pushing the main walls of the building out and causing endless damage to cross walls, and disturbance and secondary stresses in floor girders. What, then, are the causes which lead to such troublesome results? They may be classified under two heads:—

1st. Disruptive stresses due to internal movement in the cement.

2nd. Disintegrating atmospheric conditions.

Heading No. 1 can be split up, and the responsibility for the elimination of the expansions and contractions can be divided between the manufacturer and user thus:—

*A.—Causes of Internal Expansions and Contractions over which the Manufacturer has Primary Control.*

1. Due to unscientific proportioning of raw materials leading to either over-liming or over-claying.
2. Insufficient burning, resulting in the presence of loosely combined caustic lime in the cement.
3. Excessive quantities of chemical impurities, as magnesia and sulphuric acid.
4. The presence of artificial impurities, such as slag and gypsum.
5. Bad milling, resulting in a partially pulverised clinker.

*B.—Internal and External Causes over which the User has Control.*

6. The use of new and unaërated cement.
7. The use of mortars, principally for purposes of rendering, which contain too high a proportion of cement.

It will now be useful to examine each of these causes in detail, and to see how far they bear on the phenomena of expansion and contraction.

1. *The Unscientific Proportioning of Raw Materials, Resulting in Over-Liming or Over-Claying.*—It must be remembered that Portland cement is a chemical compound formed from the calcination of a mechanical mixture of some kind of lime and clay. In order to get the best results so far as rapid hardening and permanence of volume are concerned, the lime must be in such a proportion to the clay that it can enter into complete combination with the silica and alumina of which the latter mainly consists. Dr. Spencer Newberry found experimentally that the limit of the molecules of lime to those of the soluble silica in the clay is as 3 to 1, and in the same way the proportion of lime to alumina should not exceed 2 to 1. From the atomic weights we find that these proportions will represent *in weight* 2·8 parts of lime to combine with 1 part of silica, and 1·1 of lime to combine with 1 part of alumina. Supposing that these proportions are departed from to an appreciable extent, it will then be seen that the best compounds, viz., tri-silicate and di-aluminate, will not be obtained, as there will either be a surplus of imperfectly combined lime present in the cement, or the alumina will be in excess; in either of these events an alteration of volume is almost certain to occur, especially if the slurry has been over-limed and the clinker highly fired, for lime burnt at a high temperature slakes more slowly than that which has been subjected to a moderate heat, and consequently signs of expansion from the hydration of the quicklime (often concealed in the coarser particles of ground cement) do not occur sometimes for

months after the concrete has set. It is essential that a constant check shall be kept on the proportioning not only of the lime to the clay by means of the calcimeter, but also to the character of the clay itself, to determine mainly the relative proportions of silica and alumina present in it, in order that the lime may be added according to a sliding scale.

At the present time the tendency with many users of cement is to raise the tensile requirements for the week's test. This frequently results in manufacturers over-liming. Subsequent expansion (due to the causes above mentioned) disturbs the initial cohesion, with the natural result that very frequently the stress borne at twenty-eight days is actually 30 per cent. lower than that carried in a week.

2. *Insufficient Burning.*—The comparative expensiveness of coke during the last few years has tended towards too great an economy of fuel, thus leaving a considerable quantity of "pinks" or under-burnt clinker in the kiln. In this material the lime is not properly combined with the other constituents, and the consequence is that there is also present in it a considerable amount of lime which is a source of danger, but not of so great a danger as is the lime of a hard-burnt and over-limed cement, for the cements which are imperfectly calcined are naturally easier to grind, and consequently the loosely combined lime, being better exposed, will frequently pass through the whole of the dangerous stages of expansion if it has been exposed to the air for a short time on the floor of a cooling shed. Considerable danger, however, exists where a very under-burnt material is used, as shrinkage almost invariably occurs in the work.

It is, however, fairly easy to detect the under-burnt cement, as when fresh from the kiln it has a low specific gravity and a brownish colour, instead of the hard grey tint which is generally an indication of a proper degree of calcination. In cases where doubt exists it is useful as a test to mix a sample of cement with about 25 per cent. of water, pressing the mixture into a test tube with a small cylindrical rammer, the effect of which is to bring the lighter —*i.e.*, the under-burnt particles—to the top of the tube, where they form a layer sometimes ½ in. deep on a total depth of about 4 in. This top stratum sets with great rapidity, and in the course of two or three days shows a ring of a comparatively light chocolate colour. Such cements are not *necessarily* dangerous, but they most certainly require a considerable degree of aëration prior to being used upon works.

3. *Excessive Quantities of Chemical Impurities, such as Magnesia and Sulphur Compounds.* (A) *Magnesia.*—In practically every Portland cement this oxide exists in greater or less proportion. The cements manufactured on the banks of the rivers Thames and Medway show a considerably smaller amount than those made from the shales and limestones of the Warwickshire district. Until fairly recently engineers and chemists differed very considerably in their opinions as to the action of magnesia. The researches of Dr. Spencer Newberry, of Cornell University, have, however, thrown considerable light upon the action of this ingredient, and in the very able paper which he read before the New York section of the Society of Chemical Industry in 1897 he concludes with the following paragraph :—

"Magnesia, though possessing marked hydraulic properties *when ignited alone*, yields no hydraulic products when heated with silica, alumina, or clay, and probably plays no part in the formation of the cement. It is incapable of replacing lime in cement mixtures, the composition of which should be calculated on the basis of the lime only without regard to the magnesia present."

Herr Dykerhoff presented an exhaustive report to the German Association of Manufacturers, which tended to prove that the presence of over 4 per cent. of magnesia resulted in a weakening of the cement. He showed that the action of the magnesia was expansive, and took a considerably longer time to develop disintegration than does free or loosely combined lime.

Professor Le Chatelier has also experimented upon this somewhat complex question, and he mixed 5 per cent. of magnesia with a sample of ordinary Portland cement of good quality. The swelling did not commence for six months in the case of the cold paste, but in water at boiling temperature expansion began in six hours and ended in forty hours. In this connexion it is interesting to note that the magnesia, *when coarsely ground*, produces expansion, but when in the form of an impalpable powder, the swelling produced is not nearly so marked.

Whilst it is difficult to make an absolute pronouncement upon the effect of magnesia, yet it is evident from the result of experiments that it is desirable to have the least possible amount of this ingredient present in a cement, as with average grinding its tendency is towards expansion, though this takes place after a lapse of considerable time, and the effect of aëration is of no avail in reducing the dangerous properties of magnesia.

(B) *Sulphur Compounds.*—One of the most dangerous and common compounds of sulphur which can exist in Portland cement is that known as sulphate of lime. The presence of this compound is shown in the analysis by a large sulphuric anhydride figure. Like magnesia, there is bound to be a certain amount of sulphur present (derived largely from the fuel) in every cement, but if the percentage exceeds two parts it is probable that some expansion will take place. 0·59 of sulphuric anhydride will represent about 1 per cent. of calcium sulphate, and this being a readily oxidisable compound, causes considerable expansion. Personal experiments with cement to which definite proportions of sulphate of lime had been added up to a maximum of 4 per cent. have proved that it is unadvisable to either add this material or to accept a cement which contains a higher sulphuric anhydride figure than indicated above. The writer's firm, in reporting some years ago on two samples of cement made from clays which lay close together, and which, to every outward appearance, were identical (but which when mixed with the same proportion of lime gave widely different strengths in the finished cement), found upon analysis that the one clay contained but a small amount of sulphate of lime, whereas in the second case nearly 7 per cent. was present, due to sulphate in nodule form. Mr. D. B. Butler quotes a similar experience in his recent work on Portland cement; and M. Durand-Claye, who was called upon to examine mortar from a sea-wall which had failed, discovered that the sea had had the effect of washing out the sulphate of lime from the work.

The call for finer grinding of cement, together with the heavy demands made upon manufacturers for quick delivery during the last few years, have resulted in the mixing of small percentages of sulphate of lime (gypsum) with cements, the object being to retard the tendency which very finely ground cement has to set with inconvenient rapidity. It would be far preferable in the best interests of work to adhere to the older method of aeration which has been practised for many years past, as it is absolutely safe, and, providing the material is a good one, no anxiety need be felt as to the subsequent expansive action of the cement in work.

4. *The Presence of Artificial Impurities.*—Some manufacturers (although fortunately they are in the minority) use considerable quantities of two adulterants, viz., slag and Kentish rag. The former material, when ground up without any chemical preparation and incorporated with the cement, is undoubtedly an element of considerable danger, as it is very variable in its chemical composition, contains a considerable amount of sulphur, and, in addition to this, it is a dilutant which detracts very considerably from the strength of the cement when mixed with sand or gravel, so that it is both dangerous and constitutes a direct robbery so for as the user is concerned. Kentish rag, which is a sandy limestone, has no dangerous effect so far as expansion is concerned, but it is a distinct dilutant.

5. *Bad Milling.*—One of the most expensive items in the preparation of cement is the grinding of the clinker, and it is somewhat natural that manufacturers should not pay the attention to the fineness of their material which they would doubtless do if it were less costly. From the user's point of view a double advantage is to be obtained by the purchase of cement containing as much impalpable powder as possible, as its covering capacity is considerably greater when in this condition, and, further, the source of danger due to particles of free and loosely-combined lime in the coarser pieces of clinker is eliminated. The old specifications allowing a residue of 10 per cent. of a 2,500 mesh are rapidly becoming obsolete, and it is somewhat startling, but nevertheless true, that from 6 cwts. to 8 cwts. per ton of cement supplied under the old specifications was useless for a cementitious purpose.

Some experiments made by the writer with an ordinary builders' cement a short time since revealed in a remarkable way the hidden dangers due to coarse grinding. The sample in question had stood the tensile test admirably, but it was coarse; and upon application of the Michaelis boiling test the pats cracked in all directions, and over the surface of them there were a number of eruptions like miniature volcanoes. This expansion in the work might not have occurred for some months, or possibly years, but it most certainly would have occurred at some time; and as the cement was to be used for floors, and therefore in a confined lateral space, the defects which would have developed might have been exceedingly serious.

The American Society of Civil Engineers recently appointed a Committee for the consideration of the proper manipulation of tests of cement, and whilst the economical side of fine grinding is rather outside the scope of this article, it is interesting to note that in the Committee's Report of the reply to Question 9, which dealt with the size of mesh which should be used for sifting, Professor J. B. Johnson says, with reference to the 14,400 sieve, that there is no significance to be attached to results from coarser sieves, so far as cementitious value is concerned. Mr. A. E. Carey stated in the Royal Engineers' Institute Papers, vol. 24, that "every particle of cement which will not pass through a 32,257 mesh sieve is of little or no use in making concrete." Whilst this statement appears to be distinctly startling, it is gradually becoming accepted, and many of the German manufacturers are grinding to a very fine flour. A sample recently tested by the writer's firm showed a residue of only 3·2 per cent. on the 14,400 sieve. At least one important cement works in this country has under consideration the question of separating the flour of cement from the coarser particles and re-grinding the latter.

*Internal and External Causes over which the User has Direct Control.*

6. *The Use of New and Un-aërated Cement.*—This side of the question has already has already been dealt with in a fragmentary manner, but although it has been recognised from the time when Portland cement first came into popular use that it should be weathered, the writer ventures to think that even now engineers and architects do not pay sufficient attention to the necessity for shooting and carefully turning the cement prior to using the concrete. It is practically impossible for manufacturers to find adequate storage room for cooling cement, and the only alternative is for the purchaser to obtain this material well in advance of the time when he requires to use it. Case after case has come to the writer's knowledge where a cement, perfectly satisfactory in its chemical and physical attributes, has been the cause of trouble from the fact that the user of it had not exercised proper care in aërating prior to mixing the concrete. The writer's firm was recently called in to report upon the failure of a small building, and the measurements show conclusively the tremendous expansive force which is developed by the presence of lime in unweathered cement. The building when originally erected measured 16 ft. from wall to wall. A few months afterwards, when the hot cement had expanded, the measurement at floor level was 16 ft. 3 in., and the walls were bulged to an alarming extent. Much of this trouble could probably have been saved by the spreading of the cement.

Mr. Carey, in the paper which has already been quoted from, says :—

"I recollect in one instance seeing the floor of a large warehouse, the walls of which were well built of 18-in. brickwork with heavy iron cross ties, cracked and in serrated ridges from end to end. This result was due to the use of an underburnt cement in the concrete.

The effect of underburning, as mentioned before, can (unless it is excessive) be almost entirely neutralised by weathering.

7. *The Use of Mortars for Rendering which Contain too High Proportion of Cement.*—It is a well-known fact that neat Portland cement exposed to air diminishes slightly in volume. Should the material be placed in draughts or in sunshine the tendency of the shrinkage is to increase, that is to say, under normal conditions a neat cement will inevitably show slight hair cracks, especially if the face of the work is allowed to dry with any speed. As rendering is commonly used for the purpose of making

brickwork impermeable to water, it is very necessary that these cracks shall not exist, and the best way to avoid them is by the use of about one part of absolutely clean sharp sand in combination with the cement. A further cause of unsatisfactory neat rendering is due to the inability of a bricklayer to lay the face coat with sufficient rapidity, and he is therefore constantly tempted to what he calls "knock up" the partially-set cement a second time.

*Disintegrating Atmospheric Conditions.*—It is, of course, quite impossible to entirely neutralise the disruptive action set up by extremes of temperature, but it has been shown over and over again that concrete made of first-class materials is very little acted upon by fire or frost. Nevertheiess, repeated expansions and contractions must in time tell upon this material, and have the effect of weakening it. If care is taken to shield the concrete from frost until it is thoroughly set in the winter, and to keep the surface continually moist in the summer, extremely good results can be obtained, but this second precaution is frequently disregarded altogether, and the result is that the water which is necessary for the process of crystallisation is evaporated by the action of the sun or air, and the mortar or concrete consequently loses enormously in its tensile strength. Extensive experiments on this question were made at the McGill University a few years since, and in the report the following paragraph appears :—

"Attention has been drawn to the poor results obtained by the same tests (viz., on 6 to 1 concrete) by reason of long exposure to dry air. This shows up a very important point, viz., the necessity for covering up carefully all concrete and cement works exposed for any length of time to dry air and sun. The bad effects of these agents is plainly demonstrated, and it is doubtful whether much strength will ultimately be recovered."

The writer's own experience makes him quite certain that the action of the sun is as destructive upon the tensile and adhesive properties of rendering as the action of frost ; and in the construction of a heavy section of retaining wall some years since this fact was brought out in a remarkable way. A portion of the wall in question faced south, whilst another section faced nearly due west. The latter portion was rendered during the cold weather, and the former during the summer. The western portion was covered in the ordinary way, whilst the wall that faced south had no special protection given to it, and the rendering showed exceedingly bad signs of failure within a very short time of the construction of the work. The quality of the sand and the cement was precisely similar in each case, and equal care had been taken as far as workmanship was concerned.

## LETTER FROM PARIS.

THE Académie des Beaux-Arts has awarded the Prix Chaudesaigues of a value of 80*l*., comprising two years' study in Italy, to M. Moisant, pupil of M. Moyaux. First and second mentions were awarded to M. Hebrard, pupil of MM. Ginain and Scellier de Gisors, and M. Boutfroy, pupil of M. Moyaux. The subject ot the competition was "A Triumphal Arch raised in honour of a Foreign Sovereign."

During the vacation at the Ecole des Beaux-Arts a considerable amount of work has been done in rearranging the various studios, and the old Ateliers André have been transformed into a museum for the exhibition of the various work done by competitors for the past scholarships at the Ecole. It was intended to put into a thorough state of cleanliness and repair the large number of cubicles in which the competitors are shut during the Prix de Rome competitions, but the walls are so covered with cartoons and sketches by old students since become masters of French art that it was decided not to touch any of these portions. A series of new "loges" are now being arranged in a simple but rather dainty manner for the use of the recently admitted female students.

The Manufacture Nationale de Sèvres has just been enriched by the addition of a new room on the first floor for exhibiting specimens of the various work of the manufactory since its foundation under the reign of Louis XV. This room contains five large showcases, in the first of which are exhibited specimens of the first models executed in the styles of Louis XV. and XVI. ; the second contains work done during the Empire and the Restoration ; the third shows examples of the style of the Second Empire and the first productions of ceramic ware with applied ornaments. The other two are reserved for specimens of the more recent work which was exhibited at the late Exhibition.

The subject of the annual competition made under the auspices of the Société Nationale des Architectes was "An Almshouse for Victims of Labour Accidents," the cost of which, ground not included, was to be 14,000*l*. The first prize was awarded to M. Clabaut, and second and third prizes to MM. Parenty and Paulet respectively. An additional prize, given by the Minister of Public Instruction, was awarded to M. Clabaut.

M. Georges Cain, the curator of the Musée Carnavalet, is preparing in one of the rooms of this museum, on the Place des Vosges, the installation of the Victor Hugo Museum. Amongst the many interesting souvenirs of the great poet will be the curious collection of wood panels sculptured by Victor Hugo when living at Jersey, and painted by him in bright colours, somewhat in the spirit of Japanese art. These panels—of which there are a very large number—covered the walls of the poet's study at Jersey, and will now be arranged in wall panelling around the walls of the new room at Carnavalet.

The new Hotel de Ville of Dunkirk, inaugurated very recently by the President of the French Republic, is a very interesting example of the work of M. Cordonnier, of Lille, an architect whose work, in the spirit of the old Flemish style, is well known in the North of France and in Flanders. The building is of red brick, heightened by portions of white stone around the bays, and surmounted by a central clock tower of simple but elegant design and 250 ft. high. A fine staircase placed in the centre of the building leads to large and airy rooms on the first floor ; on the landing is a stained-glass window representing Jean Bart returning from one of his seafaring adventures. M. Cordonnier carried off the first premium in the competition for the Bourse of Amsterdam ; he took a grand medal at the Salon of 1892, and a grand prix at the exhibition of 1900.

The Statistics Department of the Prefecture of the Seine has just completed its report on the profits realised by the city of Paris in connexion with the 1900 Exhibition. According to this report, the Municipality has realised a profit of 160,000*l*., to which must be added the value of the newly-acquired property of the Champ de Mars and the Petit Palais, handed over to the town by the State. The extra business transacted by the inhabitants of Paris during the Exhibition is stated to have amounted to 18,000,000*l*. All the smaller buildings of the Champ de Mars have now been demolished, but nothing has yet been decided as to the ultimate destiny of the Galérie des Machines, the Palais d'Electricité, and the Château d'Eau. The authorities have entirely failed to meet with purchasers for the large iron buildings on either side of the Champ de Mars ; the public competition offers gave no result ; and it is probable that the authorities will now deal direct with those contractors whose private offers are thought worth considering.

The beautiful Fontaine de Sèvres, a piece of work by M. Sandier, which was exhibited in the grounds of the Champs Elysées and was wilfully damaged by mischievous persons, will be completely remade with certain modifications, and will probably go to adorn the garden of the Palais du Luxembourg.

The interesting old Palais de Justice of Nantes, built during the fifteenth century and menaced with destruction on account of its ruinous state, which has become a danger to the immediate neighbourhood, has at length, thanks to the steps taken by the archæological committee of the district, been classed as one of the Monuments Historiques, and will therefore be taken into hand for repairs. The architect of the Departement has been instructed to prepare designs for a new Palais de Justice, and the old building having now been purchased by the Municipality of Nantes for the sum of 1,600*l*., will be carefully restored and be used for the purpose of municipal offices and the housing of the large municipal library.

The town of Marseilles announces its intention to demolish and reconstruct the important old quarters of the town situated behind the Bourse, and has invited architects and contractors to enter into competition and to tender for the work, which has been estimated to cost about two and a-half million pounds. No offers have, however, been received, first by reason of certain onerous terms in the conditions, and also in consequence of the rather bad reputation the town has amongst architects and contractors, from whom it has from time to time, by means of promises which it is said were never kept, obtained designs and schemes which have never been put into hand, or have been carried out partially without any profit or return to the initiators.

The Municipality of Paris has decided to embellish and render more attractive the crematoria buildings in the cemetery of Père Lachaise. It is proposed to hide the ugly chimney stack by means of a large dome, and the building will be decorated in such a fashion as to render the whole aspect a little less dismal.

A syndicate of Clermont - Ferrand and L'Auvergne, under the auspices of the Touring Club, has opened a competition amongst architects for the best plans and designs for a modern hotel arranged, designed, constructed, and installed according to the best and latest precepts of hygiene and sanitation. The jury, presided over by M. Gustave Rives, architect to the Touring Club, is composed of the President of the Société Nationale des Architectes, M. Fernoux ; M. François Roux, architect ; two architects and two "maîtres d'hôtel" belonging to the district, elected by the syndicate, and two members of the syndicate. Money premiums and medals will be awarded to the authors of the chosen designs. M. Constant Orsat, delegate of the Touring Club of France at Lyons, has obtained from the municipality of St. Gervais-les-Bains, the concession of a large piece of ground in a most admirable position for the purpose of erecting a modern hotel, to be called "Hôtel du Touring Club," and a syndicate for this purpose is being formed.

The date for the inauguration of the new Sorbonne, of which the architect is M. Nénot, and which, including the immense library building to contain 900,000 volumes, has taken twelve years to complete, has not yet been decided. The 700th anniversary of the founder of the Sorbonne, Robert de Sorbon, falls on October 9, but this date, although interesting as one appropriate for the inauguration, has for certain reasons not been adopted.

M. Sortais, architect, Grand Prix de Rome, Chief Inspector under M. Bouvard at the Exhibition of 1900, has been appointed Second Inspector of Civic Buildings for the reconstruction of the Palace of the Cour des Comptes.

The house-owners who refused to comply with the terms of the recent law concerning the application of the "tout à l'égout" drainage to their houses, and were summoned by the City of Paris to immediately put into hand the necessary work, have lost their case in the Courts of Law, and have been condemned to pay nominal damages to the City, and to proceed at once to execute the sanitation work comprised in the terms of the law. As regards their defence, that the City itself had not fulfilled its duties to householders by completing the promised municipal work of sewage disposal, the judges considered that this question had nothing to do with the defendants, these latter having first to fulfil their duties with regard to the terms of the law, and then if they desired they could on their side attack the Municipality for the non-execution of its promises.

Owing to the present diplomatic difficulties between France and Turkey, M. Emile Bertone, architect, Prix de Rome, who had been entrusted with an archæological mission in Turkey, specially in view of researches at the ruins of Palmyra, has been informed officially that the mission will be changed for one in Germany and Denmark.

As the Commission des Monuments Historiques has found the credit annually voted for the restoration and maintenance of public historical buildings quite insufficient for its requirements, this credit will next year be increased by 12,000*l*., bringing the amount to 57,000*l*., an amount which will still be very moderate considering that the Commission has to deal with no less than 2,570 buildings.

NEW HOTEL, HALIFAX.—Plans for a new hotel to be built at the west end of Halifax, prepared by Mr. Lister Coates, architect, of that town, have been approved by the magistrates, to replace one to be removed for street improvements. The works are to be put in hand as early as possible.

## THE BATTERSEA ELECTRICITY SUPPLY WORKS.

Last Saturday the Central Electric Generating Station of the Battersea Borough Council was formally opened by Mr. Torrance, the Chairman of the London County Council. The large engine-room was crowded with guests, and the speeches, especially one made by Mr. John Burns, M.P., in praise of municipal enterprise, were enthusiastically applauded. Battersea Vestry obtained a provisional order five years ago, so they cannot be accused of undue haste in acting on it. They have wisely made plenty of room for future extensions. Although the plant installed has a capacity of only 1,500 h.-p., yet the buildings will accommodate plant of about 7,000 h.-p., and provision can be easily made for double this amount on the extensive site which has been acquired. One of the most striking features of the building is the octagonal chimney 220 ft. high, which is very substantially built. It measures 25 ft. 6 in. by 25 ft. 6 in. at the base and at the top 13 ft. 6 in. by 13 ft. 6 in. We were very favourably impressed with the appearance of the engine-room. Its height to the top of the roof is 55 ft. 6 in., and the girders for the travelling crane are 34 ft. above the floor. The walls are faced with white bricks embellished by blue and brown glazed tiles, and hence the light in the room is excellent and cleanliness can be easily maintained.

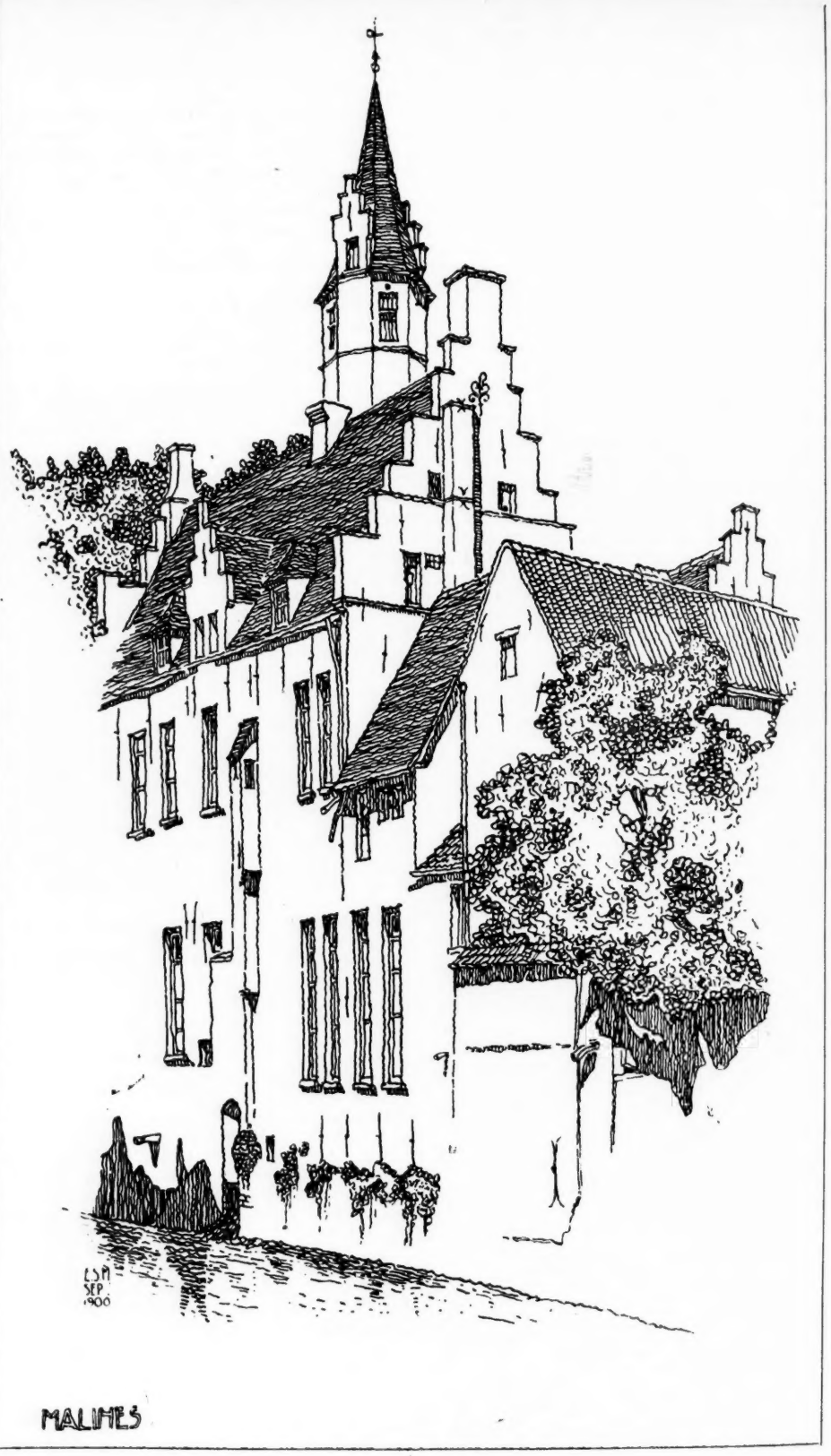
In the boiler-house are four Babcock & Wilcox water-tube boilers, which are fired by mechanical chain grate stokers, two to each boiler. The upper portion of the band, which is formed of cast-iron links, travels slowly from the front to the back of the grate, carrying with it a layer of small coal, which is fed on to it by a hopper in front of the boiler. The thickness of the layer and the speed of the band can easily be regulated by the fireman. The products of combustion on their way to the chimney pass round the 256 tubes of a Green's economiser, through which the feed-water for the boilers is passed. The water entering the boiler is thus raised almost to the same temperature as the water in it, and this leads to a considerable economy in fuel consumption.

The engines are Willans & Robinson triple expansion type, and are directly coupled to multipolar dynamos made by Messrs. Mather & Platt. The dynamos have carbon brushes, and are excellent examples of the best English workmanship. The switchboard is placed on an elevated platform at one end of the room, and there are several novel points in its design. The main dynamo and battery switches are fixed at the back of the main board, and are worked by rods attached to levers placed in front of the board. The voltage of the dynamos is regulated by handwheels placed in front of the switchboard, one turn of the hand wheel moving the rheostat slider over one contact.

The system adopted for the supply of electric energy is the continuous-current three-wire system, the pressure of supply being 230 volts, so that there is a pressure of 460 volts between the outers. The area supplied is fan-shaped, the station which is on the river being at the centre of the fan. The farthest point supplied is 2¼ miles distant from the station. The distributing mains are laid on the solid system —that is, the three cables are placed side by side in a cast-iron trough and melted bitumen poured over them; they are then enclosed by a tile covering.

Two batteries of accumulators are used which will enable the steam plant to be shut down at times of light load, and they also assist in maintaining the balance of the three-wire system. There is a very large arc lamp load, 240 street lamps having been erected. Each of these lamps takes ten amperes, and they are connected ten in series between the outers. The lamps are supported on ornamental cast-iron pillars, generally from a bracket from the top of the pillar. The design of this pillar was specially prepared some years ago by the School of Art in Edinburgh, and it has since been used in Westminster, Carlisle, and several other places.

The consulting engineers are Messrs. Kennedy and Jenkin, and the design of the station is very similar to several others recently designed by them. The only drawback to the service from the consumer's point of view, is, in our opinion, the pressure of 230 volts. This is practically the highest pressure allowed by the Board of Trade in this country. We would recommend the Battersea Borough Council to get a batch of 230-volt lamps and another batch of ordinary 100-volt lamps tested for life and efficiency. It will be interesting to see how much the inefficiency of the consumer's lamps discounts the benefit he receives from a low meter bill. Electricians are apt to forget that it is light and not electric energy that a consumer wants.



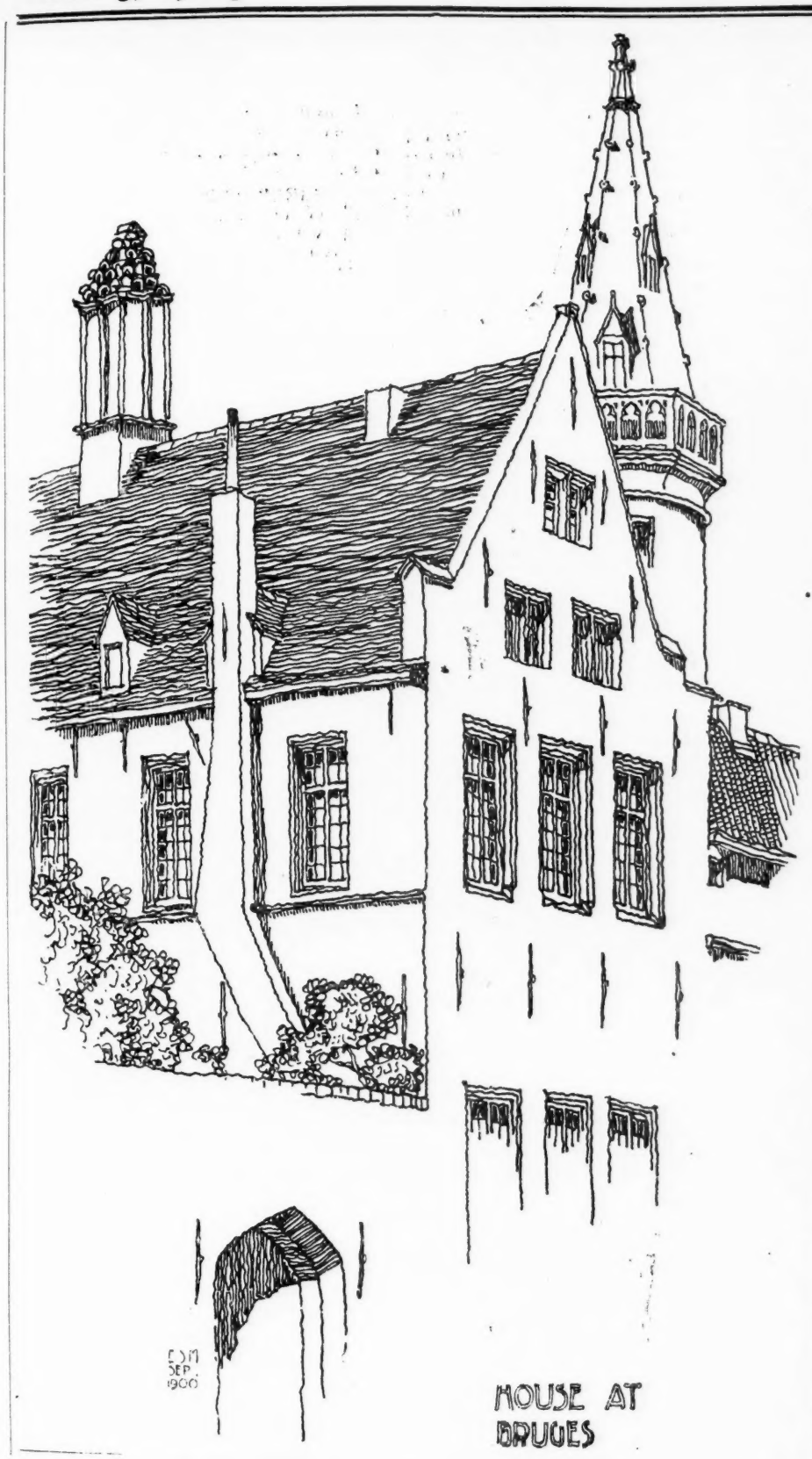

Additions to Cottage Hospital, Lytham, Lancs.—On the 21st ult. there was opened a memorial ward which has been built at the Cottage Hospital, Lytham, by public subscription as a memorial to the late Dr. Luke Fisher, who for nearly thirty years was hon. medical superintendent for that institution, and hon. secretary. The new ward is in keeping with the older part of the building, and is connected with it by a glazed corridor with tiled floor. The accommodation is for five beds. It is cross-ventilated by windows on either side, and fresh air is also admitted under each bed by a special arrangement. The floor is of polished oak, the walls are finished in Keene's cement and painted, and all corners are rounded off so as to prevent accumulation of dust. The architects were Messrs. Heywood & Harrison, of Accrington and Lytham, and the contractors were Messrs. J. E. & B. Myerscough, of Lytham.

## HOUSES AT MALINES AND BRUGES

These two views of characteristic bits of street architecture, the one from Malines, the other from Bruges, are from pen sketches by Mr. E. Stanley Mitton, architect, of Birmingham.

## THE ECCLESIASTICAL ART EXHIBITION, BRIGHTON.

The art exhibition held in connexion with the Church Congress this week at Brighton does not represent ecclesiastical art in this country at its best. If it did represent the best life in church art and handicraft we should feel that "ecclesiastical" and "art" were words henceforward not to be used in conjunction. The exhibits are shop exhibits, feeble copies of old workmanship of an age differing in ideals and in methods from those of the present. We think the Congress has been ill-advised in the title of the present exhibition. It savours more of the bazaar. Art is outside, or will not show herself. Though unrepresented, there are happily a fair number of individual workers




devoted to ecclesiastical art. Stimulatedby the work left by such men as Sedding and the younger Gilbert Scott, they are working upon reasonable lines that admit of scholarly research and originality. The shop article, however, at present represents the taste of the majority of the clergy and laity, a different state of things from when the Church led the way, when art was hid in the Church and sought for in the Church by the laity. That age is represented at the present exhibition by a loan collection of some rare and valuable objects. A fine early thirteenth-century enamelled chasse or reliquary, representing the martyrdom of St. Thomas of Canterbury, a work of great excellence; several plain, but beautifully proportioned, chalices of the seventeenth century; some pierced silver Byzantine work; a later sixteenth-century pair of silver maces. These are some of the most interesting of the gold and silver smith's art.

Of many interesting books, a Latin version of the Four Gospels written in Anglo-Saxon characters, not less than 1,000 years old, is most interesting; apparently it was bequeathed to the See of Hereford by Bishop Athelstan, who died in 1055. It is in a fine state of preservation. Also the original charter of Cuthwulf, Bishop of Hereford; a grant made with consent of Berthwulf, King of Mercia, A.D. 840, besides several fine MSS. lent by the Dean and Chapter of Hereford and by private individuals. The finest embroideries are two examples of Italian work of the seventeenth century, two cope-hoods, one representing Our Lady presenting the rosary to St. Dominic, the other, St. Francis of Assisi, receiving the Stigmata. There are some interesting copies of mural paintings from Sussex churches, the originals being of great interest, representing the oldest and most complete mural paintings remaining in England. Noticeable, also, is a very fine collection of monumental brass rubbings lent by Mr. Henry E. Franks.

WESLEYAN CHAPEL, COTGRAVE, NOTTINGHAM.—Memorial-stones of a new Wesleyan chapel, at Cotgrave, were laid on the 26th ult. The building is to be in the late Gothic style, and is from the designs of Mr. A. E. Lambert, of Nottingham. It is to seat about 220 persons, and is estimated to cost 1,250*l.*

## ASSOCIATION OF MUNICIPAL AND COUNTY ENGINEERS.

A HOME counties district meeting of the members of the Association of Municipal and County Engineers was held at Southend on Saturday, September 28. In connexion with the meeting most of the members attending paid a visit on the previous day to the works of Messrs. Millar's Karri and Jarrah Forests, Limited, at Purfleet. The party travelled to Purfleet by special train, and on arrival at the works were entertained to luncheon by the firm, Mr. C. Temperley presiding. After luncheon an inspection was made of the works, which were situated on the north bank of the Thames at Purfleet, and comprise an area of 42 acres laid out in bays, each connected by a railway siding, enabling the travelling cranes to reach each stack of timber. The sawmills are equipped with Temperley's patent cross-cut saws, driven by electric power, and turning out blocks at the rate of 6,000 per hour. The Australian wood is delivered direct on to the works from steamer discharged at a Karri-built pier, 300 ft. in length by 50 ft. in breadth. After a complete inspection of the works the journey was resumed to Southend.

The business meeting was held in the Council Chamber at Southend, on Saturday morning. Mr. E. G. Mawbey, C.E., Leicester, President, occupied the chair, and was supported by Messrs. W. Nisbet Blair, St. Pancras; Howard Smith, Westminster, T. H. Nabbicom, Bristol; A. E. Collins, Norwich; E. J. Silcock, Leeds; I. Shone, Westminster; T. Cole, Westminster (secretary); C. Jones, Ealing; A. D. Greatorex, West Bromwich; C. C. Smith, Sutton; Hayward, Sudbury; W. Harpur, Cardiff; Walker, Croydon; Pierce, Twickenham; E. P. Hooley, Nottingham, and others.

The Mayor (Mr. J. Francis), who was attended by numerous members of the Council, formally received and welcomed the Association to Southend. He said, although not so large a town as many represented at the meeting, Southend gave evidence that it had carried out works of interest, not only to themselves, but to the general community.

The President, in acknowledgment, said he had never been to Southend before, but it was an agreeable surprise to him to find so pleasant a seaside resort so near to London. He had been struck by the evidence of the great amount of public spirit which existed there. The splendidly complete system of electric traction promoted by the Corporation had been carried out entirely by the Corporation officials. They had also a very excellent sea-water scheme for watering the streets and flushing the sewers. Then, in respect to sewer ventilation, he understood they had shut up all the surface-grids and put up shafts, and that since this had been done they had got rid of all complaint.

On the proposition of Mr. A. D. Greatorex, West Bromwich, Mr. R. J. Thomas, County Surveyor of Buckinghamshire, was re-elected honorary secretary for the Home Counties district.

Mr. A. Fidler, A.M.Inst.C.E., Borough Engineer, then read a paper on the Municipal Works of Southend-on-Sea. He said the population at the last census was 28,793, and the rateable value 200,000*l.* In a decade the population and rateable value had more than doubled, a rate of increase that could only be regarded as sensational. Southend undoubtedly owed its prosperity to its proximity to London. The population was largely residential, numbers of the residents being engaged in business in London, and going to and from there every day. During the season the floating population reached a high figure, very frequently 80,000. The building by-laws in force were based on the model by-laws of the Local Government Board. Three building inspectors were engaged in supervising the erection of new buildings. The drains were all laid on concrete, with water-tight joints and disconnected from the sewers. They were all water tested before being covered up, and finally smoke tested prior to the granting of the certificate for habitation, which must be obtained before occupation of each house. A record book was kept which showed the history of each house inspected. The majority of the houses built were of an annual rental of 35*l.* to 40*l.* Recently some very ambitious buildings had been added to the town, large hotels, amongst them the unfinished Hotel Metropole, said to cost 300,000*l.*, and the Kursaal, said to cost 200,000*l.* The Public Streets Works Act, 1892, had been adopted. As soon as any new road

or street was sufficiently built upon, which very quickly followed its laying out, steps were taken to make it up in accordance with this Act. The value of work executed in this department averaged 10,000*l.* per annum. Prior to 1897 the main drainage outfall system was of a very primitive character. Sewage was discharged at many points and at all stages of the tide. The natural result was a foul foreshore with its attendant evils.

The present outfall system was designed and carried out by Mr. Mansergh, President Institution of Civil Engineers, in 1897. The works consist of two systems, viz. :—(1) The Eastern Valley system ; (2) The Western Valley system. In each a high level intercepting sewer discharged into a storage tank. There was also in each a low-level area from which the sewage was lifted to the storage tank. Each storage tank communicated with the main outfall which discharged into a channel just covered at L. W. O. S. T., about one mile from the shore and about 600 yards east of the pier. The sewage is discharged only on a falling tide, *i.e.*, at high water to within two hours of low water. The outfall was 27 in. in diameter, laid at a ruling gradient of one in 1,500, and was capable of discharging on an average 900 cubic feet per minute. Complete records were kept of the daily working and inspection of the foreshore, and it had been demonstrated that if the proper conditions were observed there was no deposit of sewage whatever on the foreshore ; it was completely carried away to sea.

The capacity of the Eastern Valley storage tank was 540,000 gallons.

The tank was covered and was constructed similar to an ordinary covered storage water reservoir. The normal daily dry weather flow into the tank averaged 400,000 gallons. The scheme was designed to deal with a population of 40,000 people with an estimated dry weather flow of 800,000 gallons per day. The present population was rapidly approaching that figure, and in view of the expected requirements he had already received instructions to report on the whole question, so that provision might be made in time and prospective requirements be anticipated. Up to two years ago the ventilation of sewers depended upon surface gratings. Reporting on the subject in 1898 he recommended that a ventilating shaft or column should be fixed opposite every manhole and the manhole cover sealed. The recommendations were adopted, and a loan for 3,500*l.* obtained by sanction from the Local Government Board. Where possible ventilating shafts (glass lined internally) 6 in. by 4 in. internal dimension, were fixed against the sides of the houses and in the highest parts. Where permission to fix these could not be obtained columns were erected on the footpath, 6 in. internal diameter and 30 ft. in height. In the days of surface gratings complaints of foul smells from the sewers were constant. Now they were never received. Southend enjoyed the reputation of possessing the longest pier in the country. The estuary of the Thames was very flat and low water mark was about one mile from the shores. From the designs of the late Mr. Brunlees the present pier was built in 1890, and cost 87,600*l.* The pier was extended in 1896-7 by 170 yards by Mr. Brunlees, jun., and Sir J. W. Barry. There was now at the pier head about 30 ft. of water at L. W. O. S. T. enabling very large steamers to land and embark passengers. The current from the pier tramway and electric lighting way generated on the pier premises, but it was intended to obtain power from the central electricity generating station and abolish the present station. The pier undertaking had altogether cost 103,000*l.*, and since its completion had contributed over 15,000*l.* to the rates. The net profit for the year ended March last was 3,622*l.* In 1897 the Corporation had conveyed to them about 20 acres of low-lying land in Southchurch for the purposes of a recreation ground. Amongst the conditions attached to the gift were the construction of a lake for the drainage of the remainder of the estate and a conduit to convey surplus water to the sea. He had prepared plans for laying out the land, and of the works proposed there had been carried out fencing, cricket pitches, planting, lake, conduit overflow and valve chambers, and groyne, at a cost of about 5,000*l.* In 1899 he reported on the question of the utilisation of sea water for street watering and sanitary purposes ; the scheme was adopted, and the works carried out at a cost of 10,900*l.* One of the most important schemes carried out by the Corporation was the light railways scheme. The estimated cost of the whole scheme was 80,000*l.*

The existing provision in the shape of marine parades and esplanades was inadequate to accommodate the large masses of people so frequently assembled there. The question of carrying out improvements in this direction had frequently been discussed, and many schemes prepared and submitted for adoption. No scheme for the central portion had yet been adopted. The author prepared a scheme in 1899 providing for a continuous parade and sea wall from the front opposite the Halfway House on the east to Chalkwell Hall on the west, a distance of four miles. The estimated cost was 300,000*l.* Generally the scheme was for a roadway of a width of 70 ft. with a sea wall, but the central portion was to be specially treated. About forty-five acres of the foreshore was to be reclaimed. The reclaimed area to be utilised for lakes, baths, pleasure-grounds, &c. Shops to be built on the north side, and a marine drive on the south side. It was estimated that the receipts from this scheme would have left a profit after paying all charges on loans, maintenance, &c. Against this, if the work was only confined to road-widening, an annual charge would be made on the rates until the loan was paid off. Quite recently, however, schemes had been adopted for the construction of about one mile of 70 ft. wide road and sea-wall on the western end of the road. The first portion, about 650 yards long, the Corporation executed at their own cost. The estimated cost was 19,000*l.* The second portion, about 1,100 yards, was being done by arrangement with the Chalkwell Hall Syndicate, who were contributing payments amounting altogether to 8,000*l.* towards the cost, which was estimated to be 21,500*l.* In 1898 the Council invited designs for a block of buildings, to contain a Town Hall and public-houses, technical school, free library, and police-station. The designs of Mr. H. T. Hare were accepted, the estimated cost being 40,000*l.* It was decided first to proceed with the technical school portion only, and the foundation-stone had just been laid by Lord Avebury. This portion would cost altogether 19,000*l.*, towards which the County Council contributed 5,000*l.* The Corporation owned a considerable portion of the cliffs to the west of the pier, which were laid out and planted and formed a very valuable and appreciated resort for the visitors in the season. In addition, the Corporation had just negotiated the purchase of Chalkwell Hall and grounds (about 23 acres) for a public park at the price of 16,750*l.*

Mr. T. H. Yabbicom, Bristol, in moving a vote of thanks to Mr. Fidler, said the paper showed that Southend had a very energetic Corporation, anxious to do everything they could for that rising community. Mr. Fidler had referred to the adoption of the Public Works Act of 1872. He (Mr. Yabbicom) thought the weak point of that Act was giving the Justices, who were not experts in road-making, a sort of veto over the wishes and decisions of a committee or council who had devoted a very large amount of time to the subject.

Mr. W. Harpur, Cardiff, who seconded, remarked that there was great difficulty in knowing in what condition wood paving should be laid down. He had been laying down a large quantity of wood paving, and his experience had been the reverse of Mr. Fidler's. The Jarrah, which had been in stock, instead of expanding, had contracted, leaving a joint of 1 in., which they had had to fill up. Now the question was, What was going to arise when they had the wet weather during the winter? Would they have the experience of Mr. Fidler, that expansion pushes the blocks out? He was having a large quantity of that rightly or wrongly condemned red gum, and he would be able to get experience of it. He believed there was nothing like getting one's own experience instead of taking what was in the newspapers.

Mr. G. E. Collins, Norwich, Mr. E. J. Silcock, Leeds, Mr. Howard Smith, Westminster, and others supported the vote of thanks, which was passed unanimously.

The Mayor (Councillor J. Francis) entertained the members to luncheon at the Kursaal, and the afternoon was devoted to inspecting the electric generating station, storeyard, and tramway works.

## Books.

*Land Surveying : Its Theory and Practice.* By Samuel Skrimshaw, F.S.I. London : Frank P. Wilson, *Estates Gazette* Office. 1901.

LARGELY owing to the wise action of the Surveyors' Institution and, we may add, of the Auctioneers' Institute, the necessity for adequate training is now thoroughly recognised as an essential by all who intend to become professional surveyors. In writing the book now before us the author evidently intended to furnish in a convenient form the information most needed by candidates for professional certificates, and to provide a serviceable book of reference for busy practical men. A cursory glance through its pages at once indicates that the general arrangement is well suited to the latter purpose. There are numerous diagrams and other illustrations, which often save pages of wordy explanations ; every chapter is subdivided into numbered paragraphs for internal reference, and the subject matter is clearly indicated by a full table of contents and an adequate index. To what extent the other objects of the work have been realised is a point that requires more critical examination.

Neglecting the customary historical sketch, the author begins with a concise statement of the purposes for which a land survey may be made, of the different kinds of surveys, and of the surveys required by the Surveyors' Institution examination. A somewhat lengthy, but necessary, dissertation follows upon the instruments used in land surveying and incidental work. In this section of the volume a useful preliminary feature is a schedule where instruments are grouped according to the purpose for which they are employed. The following extract is given to explain our meaning more fully, and to serve as an example of the method adopted more or less throughout the treatise :—

"*8. Schedule of Implements and Instruments.*

| Purpose for which used. | Instruments. |
|---|---|
| The measurement of land. | Chain arrows and drop arrows. |
| | Offset staff. |
| | Steel bands and linen tapes. |
| | Pedometer. |
| | Passometer. |
| | Perambulator or viameter." |

Another useful feature is to be found in the description and enumeration of the parts common to different instruments, and thus a good deal of needless repetition is avoided. It seems rather a mistake to select for illustration the least satisfactory form of adjusting device for instruments supported on tripods. The old-fashioned four-screw adjustment has the great disadvantage that a sensitive bubble cannot easily be levelled up by its aid so as to remain in the centre of the rim. This difficulty is owing to straining of the screws when moved in or out to any considerable extent, and we certainly think a few words of caution should be included in future editions for the guidance of beginners. In describing levels the author favours the dumpy type, as being more handy than the Y for general use. This preference is easy to understand in a country like our own, where instruments can be sent at any time to the makers for adjustments that cannot be performed by the operator, but in the colonies and some foreign countries it is desirable that the mode of construction should be such as to permit testing and adjusting to be carried out by the surveyor or engineer. The improved forms of levels introduced with the object of complying with this condition are not noticed by the author. We are pleased to observe that in his illustrations of levelling instruments Mr. Skrimshaw indicates the tribrach stand instead of the time-hallowed adjustment above mentioned. A still better arrangement is the ball-levelling joint, permitting the level to be set 15 deg. to the inclination of the tripod independently of the screw adjustment. The form of levelling-staff illustrated, and said to be "most generally preferred," is one specially devised by Mr. Stanley for his point index. It is true that this is fairly popular, although, to be strictly accurate, the form of reading originally devised by the late Thomas Sopwith is still more used than any other. As an instrument likely to remain in favour with land surveyors in Great Britain, the theodolite is more amply treated than some of the other appliances

described. It is somewhat difficult to explain on paper owing to the complicated nature of its refinements. By first describing and illustrating a rudimentary instrument, the author succeeds in imparting a very clear notion of the leading features of the theodolite, and the reader is thus prepared for the complete description that follows of its details, purposes, adjustments, and uses in practice. The box sextant is mentioned at some length in the same chapter, and deservedly so, for on fairly level ground this is a valuable and sufficiently accurate instrument for taking both horizontal and vertical angles. The remaining chapters in this portion of the book relate principally to drawing instruments, and present no features calling for special comment.

Chap. xii. serves as a sort of introduction to the technical discussion of surveying which occupies nearly all the remainder of the treatise. It contains a concise series of technical definitions, statements of the main purposes for which a survey may be made and of the order to be followed, a general outline of the principles of triangulation, and a set of plates reproduced from a field book. By the adoption of this course the ground is cleared very considerably, and the student is prepared to enter upon his work with a sufficient amount of preliminary information. In treating of the measurement of land by chaining, the author describes the ordinary mode of procedure and indicates the steps necessary when obstructions are encountered. Several examples illustrated by diagrams are set forth in so clear and practical a way, that the beginner should have little difficulty in making himself tolerably proficient after a little practice in the field. Much more time must be spent in field work before he can be competent to carry out a complete chain survey, although such an operation may seem to be quite a simple affair as shown by plans and explanations on paper. In suggesting the methods to be adopted, the author employs the tabular form of statement, and then proceeds to give the details of an imaginary survey. Although the example is described as a chain survey, it should be noted that all angles formed by the principal lines are to be read by the theodolite, the use of which was indicated in a previous chapter.

After the field book has been completed, a good deal of work remains to be done in the office. Accordingly the author is led into the writing of several chapters dealing with plotting, the computation of areas, the methods of laying out land, and the apportionment of lands. In entering upon the principles and practice of levelling, Mr. Skrimshaw adopts his system of defining in brief paragraphs the various technical terms applicable in that branch of work. Then follow some general observations upon the art of levelling, expressed in language so simple that the beginner might be excused if he imagined there could be little more to learn. Whilst this would, of course, be an entirely mistaken idea, it is the fact that what remains to be learnt is much more readily appreciated because the reader is better able to grasp the meaning of his mentor, by reason of the preliminary knowledge imparted. Although the treatment of this part of the subject is by no means exhaustive, it appears to be sufficient for enabling candidates to qualify themselves for the examinations specially in the view of the author. Traverse surveying is treated in the succeeding chapter, and here we touch the fringe of the more scientific methods adopted in engineering practice. As a combination of linear and angular measurements, traversing is particularly applicable to boundary surveys, to the survey of roads and rivers, and especially to cases where the measurement of lines across the land would be impracticable. The examples presented by the author refer more especially to the closed traverse, in which operations are completed at the original point of departure, but as the surveyor must frequently have occasion to deal with long, narrow, and winding tracts of country, some detailed instructions as to the mode of procedure in such cases could be usefully incorporated in the treatise. We notice it is said that "traversing may be performed by (*a*) the theodolite, (*b*) the prismatic compass," and this remark appears to be insufficiently qualified by the caution that the former should always be used when great accuracy is required. As a matter of fact, the compass is naturally delicate and liable to get out of order, and other demerits render its use in surveying undesirable, except for filling in details after the theodolite. Methods of setting out curves form the basis of the next chapter, the most generally accepted form—that of the circular arc—being alone considered. Two methods are explained—one by offsets and the other by angles—or, as the author describes them, "with the chain" and "with the theodolite." If the former mode of work could be followed with absolute accuracy, the final offset would cut the corresponding tangent as desired. Such a result seldom occurs in practice, except by accident; consequently, a tedious succession of trials becomes necessary until errors have been sufficiently eliminated. The angular method is far more elegant, and is the only one by which circular curves can be set out expeditiously and correctly. Sometimes a curve joining two lines may be partly inaccessible, or the points of junction may be so, and then special treatment is necessary. Contingencies of the kind have not been anticipated in the volume before us, and we think that examples suitable for these and other conditions should be included for the complete guidance of the student. Chapters on logarithms and the solution of triangles conclude the treatise. Of course, neither of these subjects necessarily belong to a work on surveying, as they may be studied by the aid of separate text-books. The object of the author has been to equip his student readers with the requisite information for following out all the other teaching conveyed, and the two chapters are well adapted for this purpose. An appendix contains various useful tables, miscellaneous information, and a sample set of examination papers as issued by the Surveyors' Institution.

Although Mr. Skrimshaw's work cannot be described as a profound or complete exposition of the whole subject, yet it possesses a distinct value of its own, and should be of considerable service to those desiring to acquire sound and reliable knowledge of ordinary surveying operations.

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*Ripon: The Cathedral and See.* By CECIL HALLETT, B.A. London: George Bell & Sons. 1901.

MR. HALLETT has produced a conscientious little book on the minster church of Ripon. No claim is made to originality of treatment or of views, but his indebtedness to almost all previous writers on the great church, from Canon Fowler down to some modern guide-books, which he had better have eschewed, is fully acknowledged. Indeed, if Mr. Hallett had more opinions of his own, or tried to arrive at some conclusions on puzzles, the book would have been clearer and more readable. As it is, those who know the church fairly well cannot help being rather confused by the diversity of statements put forth, whilst those who visit it for the first time with this book in their hands will, on several points, be left quite to their own judgment as to dates and probabilities. For instance, although Mr. Micklethwaite's conjectural plan and explanation of the crypt are given, other theories and views are woven into the letterpress after such an embarrassing fashion that it is not only impossible to realise what are Mr. Hallett's own ideas, but what all the differing statements as to square ends and apse ends, Roman or ultra-Roman, mean. We strongly advise Mr. Hallett to read and study the late Mr. G. G. Scott's masterly treatise on the "History of English Gothic Art," and he will then have clearer ideas of his own on the subject, and consequently be able to impart them to others. As to the old stone pulpit in the north transept, the short paragraph and note about it merely suggest a variety of theories as to date and original position. The fifty-three illustrations are mostly from photographs by Mr. Watson, of Ripon, and come out excellently. We are specially glad to see the clean picture of the twelfth-century vaulting of the north transept aisle. The picture of the exquisite fifteenth-century carving of the quire stalls is another good one; but is not the photograph of the reconstructed angle of the great tower somewhat out of focus?

The history of the church, apart from its description, which occupies the first thirty-seven pages of the book, is well told after a concise fashion. It adds much to the value of the book that a plate is given of the striking and in some ways beautiful west front of Early Perpendicular date, unfortunately cleared away in the 1862-70 restoration. The descriptive part of the book fails in lack of explanation of the extent of the various Victorian alterations. The high altar was then removed to the easternmost arch, thus destroying the old processional path.

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*Llandaff Church Plate.* By GEORGE ELY HALLIDAY, F.R.I.B.A. London: Bemrose & Sons.

THIS is a remarkably good and clearly-compiled book on the church plate of the diocese of Llandaff, that is of the counties of Glamorgan and Monmouth. Mr. Halliday is much to be commended in having refrained from giving a long general introduction on the question of old church plate in general, and of English in particular. This has been already done far too often by the compilers of lists for other counties. Mr. Halliday's diligence in searching out and describing the church plate of all the parishes in these two counties—many of them in out of the way districts—has been rewarded by bringing to light many interesting examples. There is only one piece of pre-Reformation plate left in the diocese, and that is the paten now in use at Llanmaes, Glamorgan, which has not previously been chronicled or illustrated. The hall-marks undoubtedly point to 1495 as the date; in the centre is the vernicle, or face of our Lord. The diocese possesses about seventy-five examples of chalices of the Elizabethan period, many of them with their paten-covers still remaining. Some of them are of unusually good design; the best of those with the ordinary foliated strap work pattern is that at St. Michael's Church, Risca, Monmouth. It bears the date 1573 on the paten-cover. At St. Mary's, Monmouth, is a grand piece, hall-marked 1591, which is quite unique as a chalice. The cover takes a spiral form and is richly embossed; it is much like a standing cup (1598) belonging to the Armourers' Company. Mr. Halliday seems to doubt it having originally been a secular cup because of the shape of the bowl; but it is quite impossible that a church cup at such a date could have been designed with a cover of this kind. There are several most interesting Commonwealth specimens, as well as some double-handed porringer-shaped cups of later date and similar origin, and also a few with the heraldic bearings of their donors. Nor has Mr. Halliday forgotten to take note of the old pewter still scattered about in the rural districts of the diocese.

Among other useful though rather painful results of putting on record such a catalogue as this is the exposure that is made of the poverty-stricken character of much of the "plate" (?) now in use in the diocese. It is distinctly discreditable to the diocese that upwards of twenty churches, and several of them in towns, only use Sheffield or other kinds of plated silver. In one parish, that of Tonyrefail, the only vessels are of pewter. In two other cases they are of "white metal." At Cwmcarn, Monmouth, it is said that "the vessels belonging to this church are of glass;" whilst at Bettws St. David, in the same county, the vessels are "a chalice, paten, and flagon, brass, tinned inside."

The illustrations supplied by Mr. Halliday are numerous and excellent of their kind, whilst the typography and arrangement do credit to the publishers.

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*A Theoretical and Practical Treatise on Oblique Bridges in Stone and Brick.* By FRANCIS CAMPIN, C.E. London: The Publishers of the *Railway Engineer*.

THE little book suffering from this formidable title is an interesting chapter on the subject of oblique bridges, but it has neither the form nor the method of a treatise, in the ordinary acceptation of the term. After a few general observations upon the conditions necessary for stability in masonry and brick structures, the author proceeds to show the method of preparing the drawings from which to build a skew arch. The demonstration occupies about thirty-four pages, or nearly three-fourths of the whole essay, and is based entirely upon one example taken from actual practice, in which the section of the arch on a line at right angles to the axis forms a segment of a circle. Such a section necessitates the use of skew backs shaped so as to fill the triangular spaces resulting from the oblique intersection of the bed-joints with the line of springing. The author does not mention the fact that this treatment is unnecessary if an arch springs vertically from the abutments in such a way that none of the bed-joints intersect the line of springing. We notice he implies that the bed-joints should be

spirals winding around the axis of the arch. This is correct so far as practice is concerned, although it must be remembered that spiral joints are merely adopted as an approximation, because joints of the correct form are difficult of execution. No mention whatever is made of the ribbed skew-arch, a method of construction usually followed in the United States, and sometimes adopted in this country. It certainly ought to receive notice in a work professing to be a treatise. With the exception of six lines referring to brick arches, the whole of the book is devoted to stone bridges. An improvement would be effected if the various steps to be taken in the preparation of the drawings were arranged in consecutively-numbered paragraphs, and it might also be convenient if practical hints on constructional details, templates, and gauges were separated from the demonstration of theoretical principles.

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*Practical Mathematics for Beginners.* By Frank Castle, M.I.M.E. London: Macmillan & Co., Limited. 1901.

Like a previous work by the same author, termed "Elementary Practical Mathematics," the volume under our notice is intended for the assistance of students attending classes where the syllabus of Practical Mathematics issued by the Board of Education forms the basis of the lessons. The plan of the book is admittedly due to the inspiration of Professor Perry, who, it is well known, seeks to place the teaching of mathematics on a practical basis. His views were put forward at the recent meeting of the British Association, and met with a good deal of support from those present, although allowance had to be made for the unmathematically humorous terms in which they were expressed. The particular mode of teaching mathematics advocated is rapidly growing in popularity, but, as Mr. Castle admits, the subject is in a tentative stage. This condition probably accounts for the recent revision of the syllabus by the responsible authorities, and incidentally for Mr. Castle's present book, which might very well have been described as a revised edition of his former work. Judging by the preface, the "tentative stage" appears to exist also for the author. In his former treatise it was said that the inability of students to profit by technical instruction given in polytechnics is largely due to insufficient preliminary training in mathematics. Now we are told that engineers and artizans can be given a mathematical training through the agency of their daily work, and preliminary training upon academic lines is said to be unsuitable for the practical man. We are rather afraid that the author has been taking some of Professor Perry's hyperbolical language in too literal a sense, for to suggest that engineers and artisans can be conveniently trained through the agency of calculations made in the course of work is about as reasonable as to propose that authors should learn spelling and grammar by the aid of the books they write. Of course, every one who is wise will continue to learn as long as he lives, but the value of preliminary training must not be depreciated. In the body of his useful and carefully considered work, Mr. Castle provides adequately for those in want of this preliminary training, thus affording another proof of the adage that "example is better than precept."

# Illustrations.

## DESIGN FOR THE ARCHITECTURAL TREATMENT OF VAUXHALL BRIDGE.

In a paper a year or two ago at the Institute of Architects on "The Architectural Treatment of Engineering Structures," the question of the treatment of Vauxhall Bridge, which was then attracting so much attention from architects, was touched upon, and I appended to the paper a small elevation and section, of very simple and plain character, merely showing the principle of treatment by which, accepting the engineer's arch-lines and parapet line as conditions imposed, the bad effect of the very thin crown of the arch might be minimised by the reduction of the cornice to a corbel-table, and carrying the voussoir lines right up to this over the whole surface of the arch masonry. In the same small drawing a buttress form of treatment, different from that which has been usually employed in large bridges, was suggested.

It has been a matter of some interest to me to try what could be done with this skeleton idea, when worked out into a more complete and architectural form, and I endeavoured to do this, though somewhat hurriedly, in the geometrical drawing published in this issue, and which was prepared and exhibited at the last Royal Academy exhibition. The perspective view which is also published in this issue was made subsequently in order to try the effect of the design in perspective.

As far as Vauxhall Bridge is concerned, at the stage at which the work has presumably now arrived, the interest of the design may be regarded as of purely theoretical or academical character; a fact, however, which removes one objection to its publication. As an attempt to deal with the problem from a new point of view, it may not be without interest to architects; and if any engineers condescend to look at it, it may also serve, at all events, as an explanatory diagram to make clear some points which it is not very easy, in general, to get engineers to enter into.

It must be remembered that this is a design for facing with granite a concrete bridge, and the object of the treatment of the voussoirs is partly to suggest this idea. In the original design of the County Council engineer a great point was made of having a large cornice (very badly profiled) and a very heavy course of rusticated voussoirs, with the idea of imparting "power" to the design, as if this rusticated arch were the main element in the stability of the arch. Instead of this, the stability of the arch really resided in the concrete construction behind the granite, and the rusticated voussoirs were not only a sham expression of the structure, but really an unnecessary weight added to it. A further æsthetic result of the large cornice and the large voussoir course was that, owing to the narrow limits left between the crown of the arch and the road line, the cornice and the voussoirs were crushed up together at the crown in a most clumsy manner, the voussoirs shorn of nearly all their depth and apparent stability and reduced to mere squares of masonry, and the appearance of the crown of the arch hopelessly weakened. In fact, a worse piece of design in masonry has seldom been seen. It is to be hoped that in execution, at all events, there is to be some improvement on this.

The idea in the treatment of the arch face in my design was this: by reducing the cornice to a corbel-table of moderate proportions a greater height and a better proportion is left for the centre voussoirs. By carrying out the voussoir treatment throughout, and by slightly recessing each alternate voussoir and treating it in a decorative manner by fluting it, the idea of its being a flat *revêtement* and not an important constructional arch is conveyed, or is meant to be; and the alternate thinner and thicker proportions of these voussoir courses show, on the soffit of the arch, as an effective margin to the concrete surface, and as toothed into the concrete in a manner that suggests the coherence of the whole structure. The voussoir facings might perhaps very well have been thinner than they are shown in the drawings. Heraldic escutcheons surrounded by wreaths are introduced as an appropriate and effective manner of relieving the wide surface at the haunches of the arch.

The treatment of the pier would be as applicable to a purely masonry bridge as to a concrete structure faced with masonry. It represents the face of the pier treated as in my opinion it always should be treated, as a kind of buttress, not as a feature designed to support vertical weight, as it almost always is treated. Indeed, this is the only design for a bridge on a large scale that I have ever seen, in which this buttress principle has been adopted or suggested. Although the decorative details are classic in type, the treatment of the centre projection carrying the lamp-standards, and breaking out as a projection from the lower face of the buttress, is really suggested by Gothic rather than Classic associations.

Some people seem to have an idea that it is a rigid rule to have the lamp-standards over the centre of the arch, and when my first sketch of the idea was published in the Institute *Journal*, some wiseacre was good enough to tell me in print, with an air of authority, that I had got the lamp-standards "in the wrong place." If he had known anything about the subject he would have known that, as far as Thames bridges are concerned, the authority as to the right or wrong place for the lamp-standards in a practical sense, is the Thames Conservancy, whom I consulted in the matter, and who sent me a long letter going into the whole subject, the broad conclusion of which was that there were precedents on the Thames bridges for both positions; that they were rather uncertain at present which was really preferable, but that their opinion on the whole was in favour of having the lamp-standards over the pier rather than over the arch. In an architectural sense there can be no doubt that the best position for the lamp-standards is over the pier, where they can form the culminating point of an architectural base or pedestal. In the present case this is emphatically so, because the weak point of the bridge, on the engineering lines, is the want of depth at the crown of the arch, and the position of a large lamp-standard there would appear to emphasise this defect by adding weight just where the structure looks weakest.

Another point in the design to which I may draw attention for a practical reason, is the nature of the crown moulding or finish to the rusticated cut-water pier, which is formed by a series of recessed fillets, so as to avoid any projection under which any part of a boat might be caught, with a rising tide. This is not an imaginary danger.

It may be added that the tone-block reproduction of the perspective does not quite truly represent the actual values of light and dark; foreground cutwater buttress should be a good deal darker under the arch; and on the other hand the shadow of the central projection of the buttress, for some reason, has come out much too black. Tone-block reproduction is a rather capricious process, and one never quite knows how it will deal with lights and darks in a drawing.

H. H. S.

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## DESIGN FOR BRIDGE OVER THE WEY, AT GUILDFORD.

We must regret that this sheet of drawings does not represent a bridge that has been or is to be carried out, as the Guildford Corporation eventually determined, it appears, to erect an iron bridge. The design however is of considerable interest as an example of an architect's treatment of a small bridge in a country town, and shows also that in such cases it is possible to find an architect who can dispense with the assistance of the engineer, as the author's business-like structural details indicate. The treatment of the lines of the parapet is very graceful, and the balustrade and other details show a departure from ordinary precedent. The following is Mr. Ricardo's note on the design:—

"The bridge at the foot of the High-street at Guildford was partially destroyed in the winter of 1899-1900 by some stacks of timber drifting loose owing to a violent and sudden flood, and getting jammed in one of the two effective archways. As the waters rose the timber prised up the arch from underneath—a very unexpected form of accident. The bridge originally was a mediæval five-arched stone structure, built to supplement the ford, but in time the encroachments of the town absorbed two of its arches. About one hundred years ago, owing to the increase of traffic, the bridge was nearly doubled in width by brick arches springing from the abutments and sterlings on one side. A further increase of width was obtained subsequently by carrying the footway on iron cantilevers.

The proposals before the Town Council were three:—

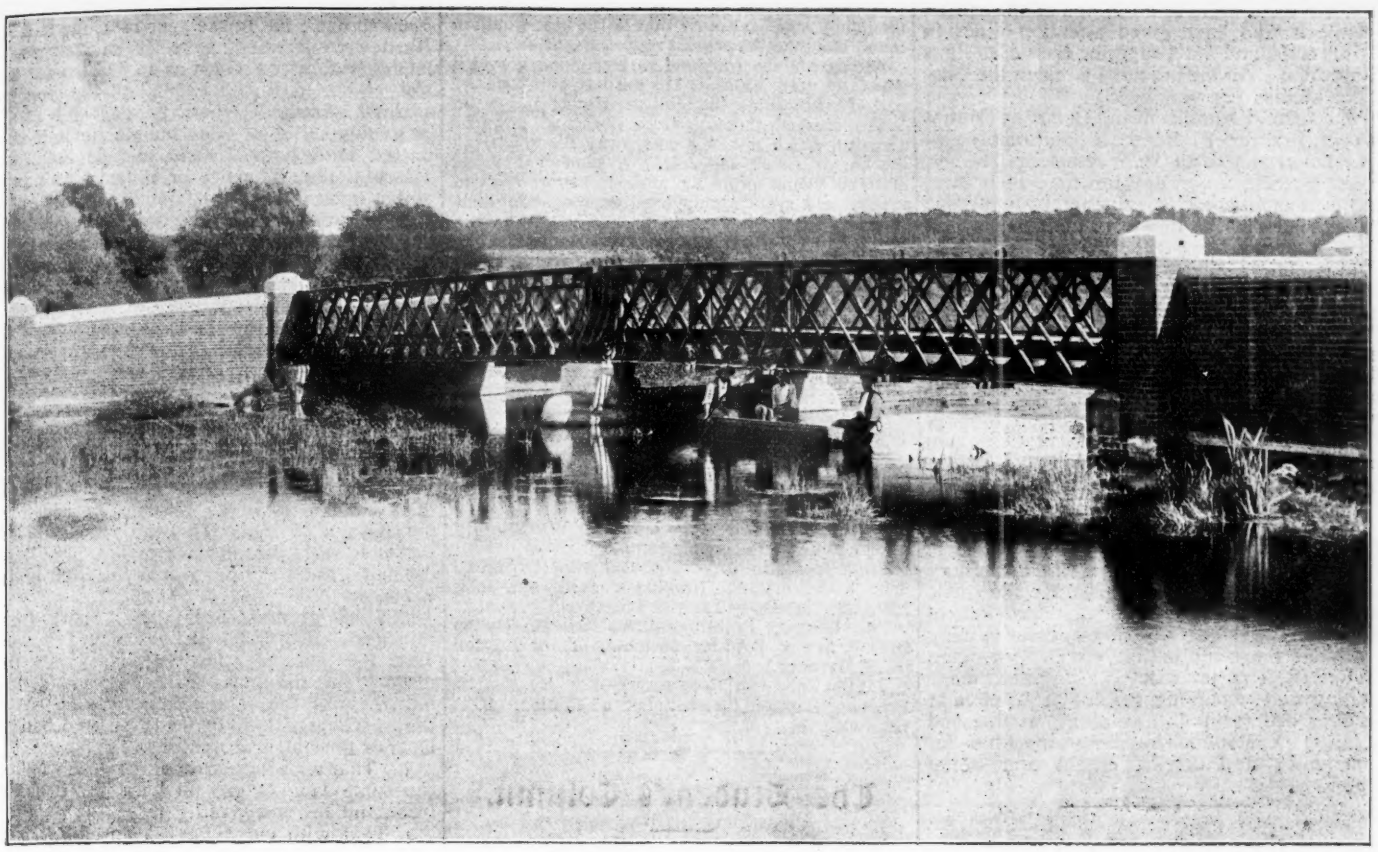
1. To retain as much of the existing structure as possible, and to bridge over the gap with a masonry arch, using the existing abutments.

2. To make a new bridge in concrete faced with brickwork on fresh piers and new abutments, and so increase the waterway; and

3. To make an iron structure, going from bank to bank, and giving a waterway clear of all obstruction.

This last scheme is what has been eventually adopted by the Town Council.

In the scheme illustrated the difficulties that had to be met with were those of height, and that the axis of the bridge was not perpendicular to the axis of the stream. It was required that the roadway of the new bridge should not rise so steeply as that on the old bridge, whilst the height above the water-line should be increased for the accommo-



*Breamore Bridge. Mr. W. J. Taylor, Engineer.*

dation of barges laden with hay, timber, &c. The skewness of the piers was proposed to be masked by carrying the footway on arches perpendicular to the main axis of the bridge, starting from corbels on small abutments rising from the cutwaters, the spandrels to be filled in with local (Bargate) stone, the balustrade and parapet to be made of Purbeck, the bricks to be thin red paviors well fused by hard burning. The main mass of the structure to be of Portland cement concrete.

The builder's estimate for removing the damaged structure and erecting the new one as shown, exclusive only of metalling the roadway, was 5,500*l.*

HALSEY RICARDO."

## BREAMORE BRIDGE, HAMPSHIRE.

THIS "county bridge" is situated in the west of Hants, about eight miles south of Salisbury, and carries the district road from Breamore to Woodgreen across the River Avon. The new bridge, just erected by the County Council, replaces an old wooden structure which has spanned the river at this point since the year 1846, up to which date passage was obtained by a ford only.

The new bridge consists of two spans of 41 ft. 5½ in. each, with a clear width of roadway of 16 ft. The girders are of the lattice type, and built of English steel; the roadway is carried on corrugated steel sections, spanning from girder to girder and rivetted to their lower flanges. These sections are covered with tar concrete, on which the ordinary road metalling is laid.

The pier and abntments are of red brickwork and concrete with Swanage stone templates and dressings.

The bridge is calculated to carry the heavy traffic of the present day with the usual margin of safety.

It will be noted that the girders, forming an arc of a circle from abutment to abutment with a 9 in. rise in the centre, are fixed clear of all masonry and brickwork so that all parts may be as far as possible easy of access for painting and inspection, and the lines of construction show themselves and preserve the simplicity of the work. The outside members of the stiffeners are scrolled and looped up over the top flanges of the girders.

Separate tenders were invited for the steel superstructure, and the girders were made by the Thames Ironworks and Shipbuilding Company, who, notwithstanding the additional trouble involved by some parts of this small work varying from the usual practice, took the greatest pains to faithfully interpret the drawings. The substructure was satisfactorily carried out by Mr. F. Osman, of Southampton, and the foundations being in shingly gravel gave some trouble.

The bridge was designed by Mr. W. J. Taylor, the County Surveyor of Hants.

## TRADE CATALOGUES.

MESSRS. JAMES TRUSCOTT & SON, of London, send us a copy of "The Engineering Price List," which is said to be "the recognised medium for shippers and export merchants." It is difficult to know why the volume should be called a "price list," inasmuch as, with the exception of the index, it consists entirely of advertisements, very few of which include prices. Although the book does not appeal particularly to the bulk of our readers, it may well be useful to firms desirous of ascertaining suitable sources of supply for various classes of machinery and engineering materials.

We have received from Messrs. Barford & Perkins, engineers, Peterborough, a copy of their catalogue of "steam cooking, heating, and laundry appliances." The cooking section contains illustrations of boiling pans, vegetable steamers, ovens, boilers, and other apparatus required in the kitchen departments of large buildings. A statement of the fittings required for various numbers of persons will be of service. The laundry section contains illustrations and descriptions of Washington Lyon's well-known steam disinfecting apparatus, in addition to laundry and washhouse machinery and fittings. The catalogue might with advantage have been extended. The descriptions are too meagre to be of much service, and the sizes of the different apparatus are, with few exceptions, left to the reader's imagination. No doubt fuller information can be obtained "on application." A list of important works fitted up by the firm is given in the catalogue, together with a number of testimonials.

The Bon-Accord Acetylene Gas Company, of Aberdeen, send us their new catalogue of appliances for generating and utilising acetylene. The price of a generator, with purifier and all the generator adjuncts, is quoted at 15*l.* for one of sufficient size to supply ten 25 candle-power lights for nine hours, 50*l.* for one to supply sixty lights, and 130*l.* for one to supply 160 lights. The company state that they have fitted a large number of steamships with acetylene installations, and that the generators have been found to work satisfactorily in all weathers. For harbour and railway works, and for contractor's work in general, portable lamps of high candle-power and convenient form are manufactured. The calcium carbide required for the generation of acetylene must not be stored in larger quantities than 5 lbs. (in separate 1 lb. tins) without a licence from the Local Authorities; but the company undertake to procure the necessary licence for their customers when required, the cost of which is 5*s.* per annum.

Messrs. J. H. Sankey & Son send us their new general illustrated catalogue, which comprises three sections—sanitary goods, bricks and tiles, and fireclay goods. Their stoneware pipes have been tested at Kirkaldy's, and it is stated that the 4 in. 6 in. and 9 in. sizes have stood an average test of 4,000 lbs. The catalogue of course includes all kinds of pipe junctions and bends, and they note a novelty in connexion with this class of work, in the shape of an interceptor with a spirit-level attached, to ensure level seating. There are some good sections of pedestal closet, though the one called the "Trent" we cannot recommend in consequence of the shallowness of the standing water in the basin. The porcelain enamelled fireclay lavatory range is an excellent article of its class. The catalogue includes enamelled and salt-glazed bricks, fire-bricks, &c., as well as their "Purimachos" fire-cement, which is stated to be capable of withstanding a greater heat than that necessary for the fusion of iron. A very large number of stock sizes of fire-bricks and tiles are kept in stock. The firm should, however, get some better designs for their "red finials," garden vases, &c.

The General Iron Foundry Company send us a large illustrated price-list of their ranges, stoves, mantel registers; iron, wood, and marble mantels; steam cooking apparatus; baths, lavatories, and closets; sanitary castings; soil and rain-water castings; general castings, and stable fittings and hot-water goods. The catalogue illustrates a great variety of ranges, large-size, cottage, portable, and ship ranges, and a set of directions for the best fixing of ranges. Of the large variety of grates illustrated, many are over-ornamented, and though we cannot afford space to particularise them here, the firm may be assured that, in a general way, it will be the plainer ones and not the ornate ones that will please the best architects and the best class of customers. Most of the iron mantels, too, are behind the day in point of design, and the firm would find

t worth their while to go to one of the artistic architects who have given attention to design of this class, and get a superior class of designs from them. All the practical work in the catalogue seems to be very good.

The Crittall Manufacturing Company (Manor Works, Braintree) send us a handsomely got-up folio catalogue of iron casements, sashes, doors, gearing &c. They illustrate their casements in a most practical manner, by numerous full-size sections of the working parts, which show what good provision is made for rain-tight qualities. There are full technical illustrations, also, of the Crittall "Safety" casement, capable of being reversed for cleaning. The malleable iron handles and casement stays show variety and very good character of design. The catalogue includes elevation drawings of sashes for various purposes, sash gearing, sliding doors, wrought-iron roofing, &c. It is a useful and practical catalogue, well illustrated and in the right way—for use rather than show.

Messrs. George Anderson & Co. (Carnoustie, Dundee) send us, through their London agents, Messrs. M. Powis Bale & Co., a short illustrated list of their stone-working machinery and contractors' plant. These include their patent diamond saw, with diamond cutters electrically welded into the blade, for sawing sandstone, limestone, marble, &c.; also a swing frame saw, a rotary disc polishing machine, a planing and moulding machine; a circular rubbing bed for polishing stone, marble and granite; a stone channelling machine for quarrying; and derrick cranes and aërial ropeways.

## Correspondence.

*To the Editor of* THE BUILDER.

### PRODUCTS OF GAS BURNING.

SIR,—Your able contributor, in the thirteenth section of his series of articles entitled "Gas and Gas Fittings," states, at p. 275, that one of the objections to the use of gas is "(3) . . . . the formation of carbon dioxide" (carbonic acid gas=C.O.²). Now, the Bunsen or atmospheric burner, in which air is mixed with the gas before combustion, and which gives a blue flame with much heat and but little light, produces mostly, not carbon dioxide, but the more deadly poisonous carbon monoxide.

As the incandescent burner is primarily an atmospheric burner, and gives off the deadlier monoxide before the mantle is placed in position, I would be thankful to be informed distinctly and authoritatively whether the incandescence produced by the mantle has the effect of transforming the product of combustion from mainly carbon monoxide to mainly the comparatively less harmful carbon dioxide. If that is so, the result is not more prejudicial to health than the use of ordinary flat-flame and argand burners. Am I right in so assuming? A. H.

*** When the gas is burning under normal conditions the Bunsen or atmospheric burner does not produce carbon monoxide in the ultimate products of combustion. Carbon monoxide being a combustible gas, any volume of this product of incomplete combustion which may be formed within the flame is oxidised into the comparatively harmless carbon dioxide before it can escape from the outer zone of flame. The products of combustion evolved from an incandescent burner are not affected by the presence or absence of the mantle. A false alarm was raised in 1894 by M. Gréhant, who contributed to the *Comptes rendus de l'Académie des Sciences* the results of some experiments which he believed proved that a minute proportion of carbon monoxide was present in the product of combustion from incandescent burners. In a subsequent note contributed in the same year to the same journal he admitted, however, after experimenting upon a dog, that the use of the incandescent burner is not attended with any danger of poisoning by carbon monoxide. In view of the importance of the subject an investigation was subsequently made by the *Lancet* Sanitary and Analytical Commission, with the result that the commission reported (January, 1895) that no trace of carbon monoxide could be discovered in the combustion products from incandescent gas burners.

THE WRITER OF THE ARTICLES.

### LONDON STREETS.

SIR,—The metal bins for the reception of gravel, sand, and the like, placed in the streets for roughing the roads when slippery, "have come to stay," but they are as ugly as they are useful. In these days of art applied to objects of daily use there is nothing to prevent these receptacles being made by a series of ornamental iron castings, like good old firebacks, and bolted together in segments, so that any size and shape could be produced to suit the position. I expect by the new improved American moulding machines now in use the cost would be found less than the present ugly ones.

As regards the roughing material, fine gravel is generally used. This is the hardest and toughest part of quartz flints, the remains after ages of wear. When crushed these produce the most powerful abrasive, which not only cuts away the roads, but the horses' shoes and feet. A somewhat softer material would probably answer better, such as granite and syenite chippings, or mountain limestone. W. BRINDLEY.

*** As to the first part of Mr. Brindley's letter, we confess that we do not see any particular suitability in surface decoration for gravel-bins, and should regard the proposal to make them "ornamental" with some anxiety. The best art in such a case is to give them the best form for their practical use.—ED.

## BOOKS RECEIVED.

OLD DUTCH TOWNS AND VILLAGES OF THE ZUIDERZEE. By W. J. Tuyn. (T. Fisher Unwin.)

THE CEMENT USERS' AND BUYERS' GUIDE. By "Calcare." (E. & F. N. Spon.)

THE LAW RELATING TO GAS AND WATER. By John S. Will. (Butterworth & Co.)

FIRST STAGE BUILDING CONSTRUCTION (Organised Science Series). By Brysson Cunningham, A.M. Inst.C.E. (University Tutorial Press.)

THE LONDON BUILDING ACTS, 1894-98. By the late Professor Banister Fletcher. Third Edition (B. T. Batsford.)

VALUATIONS AND COMPENSATIONS. By the late Professor Banister Fletcher. Second Edition. (B. T. Batsford.)

## The Student's Column.

### GAS AND GAS FITTINGS.

14.—SHADES, CHIMNEYS, REFLECTORS, AND GUARDS.

FLAT-FLAME SHADES AND GLOBES.—Shades are usually placed around gas-flames to produce greater diffusion of the light, to prevent the irritation caused by exposure of the eyes to direct rays of light from the naked flames, and to give a more pleasing appearance to the apartment illuminated.

All shades (the term "diffusers" would be preferable) offer a certain obstruction to the passage of light, but the proportion of light obstructed varies according to the shape of the shade and the material of which it is constructed.

Mr. W. King found that when No. 3 fish-tail burners were employed, globes of different descriptions obstructed the passage of light in the proportions shown in the following table:—

| | Loss of Light. |
|---|---|
| Clear glass globe ..... | 10·57 per cent. |
| Ground " " ..... | 29·48 " |
| Smooth opal " ..... | 52·83 " |
| Ground " " ..... | 55·85 " |
| Ground opal with painted figures ..... | 73·98 " |

The obstruction exerted by glasses of different descriptions and thicknesses is shown in the following table of results obtained by Mr. F. H. Storer, and published in *Silliman's American Journal of Science and Arts*. He placed sheets of the various glasses at a distance of 3 ft. from the Argand burner (with ordinary chimney) in which the gas was consumed, and determined the loss of light in each case:—

| Description of Glass. | Thickness of Glass. | Loss of Light. |
|---|---|---|
| Thick English plate..... | ⅓ in. | 6·15 p.c. |
| Crystal plate ..... | ⅛ " | 8·61 " |
| English crown ..... | ⅛ " | 13·08 " |
| Double English window glass ..... | ⅛ " | 9·39 " |
| Double German ..... | ⅛ " | 13·00 " |
| Single German..... | 1/16 " | 4·27 " |
| Double German ground | ⅛ " | 62·34 " |
| Single German..... | 1/16 " | 65·75 " |
| Berkshire (Mass.)..... | 1/16 " | 62·74 " |
| Berkshire enamelled*... | 1/16 " | 51·23 " |
| Orange coloured window glass ..... | 1/16 " | 34·48 " |
| Purple ditto ... | ⅛ " | 85·11 " |
| Ruby ditto ... | 1/16 " | 89·62 " |
| Green ditto ... | 1/16 " | 81·91 " |
| A porcelain transparency | 1/16 " | 97·68 " |

* Ground only on portions of its surface.

Mr. Storer thought that the percentage of light obstructed remained the same whatever the distance between the illuminant and the glass screen; but in the year 1881, the late Mr. Hartley contributed a series of papers on "Observations on Glass as an Obstructor and Reflector of Artificial Light," to the *Journal of Gas Lighting*, in which he gave the results of a long series of experiments he had conducted with both Argand and flat flames to ascertain the influence of different kinds of globes upon the light obtained in a horizontal and in a downward direction, and he found that the greater the distance between the flame and the glass, the greater was the proportion of light obstructed. Hartley's papers are worthy of careful study by manufacturers of gas shades, and the general conclusions he drew from the results of his experiments, and enumerated in the following order, may serve as a useful guide in the selection of shades for different purposes:—

*Horizontal Lighting: Sheet Glass.*

1. That ordinary sheet glass, apart from thickness, varies in its obstructive power to the passage of light. That the *percentage loss increases* with the distance of the glass from the flame, and *increases* also as the *light grows stronger*.

2. That ground sheet glass, apart from thickness, also varies in obstructive power. That the *percentage loss increases* with the distance of the glass from the flame, and *decreases* as the *light grows stronger*. That the percentage loss depends on which side, clear or ground, is presented to the flame.

3. That with flashed opal the losses follow the same law as ground glass for distance from, and for power of light.

4. That with clear glass as an *obstructor* of light in front of the flame, and clear glass behind the flame as a *reflector* of light, the reflected light reduces the *loss* to a degree dependent on the distance of each glass from the flame.

*Globes.*

5. That a clear glass globe obstructs light from an *Argand* flame, but increases the sensible light from a *flat* flame.

6. That globes of ground glass obstruct less light than sheets of ground glass. That the percentage loss *diminishes* as the light grows *stronger*; and is, for an average light, from 18 to 20 per cent.

7. That opal globes obstruct an amount of light equal to 33 to 65 per cent.

*Overhead Lighting.*

8. *That the amount of light yielded by a flame in an angular direction is much less than it yields in a horizontal direction.*

9. That glass globes with elevated or overhead Argand flames *reduce* the power of the light—clear globes, about 3 per cent.; ground globes, about 21 per cent.; and albatrine globes, about 23 per cent.

10. That glass globes with flat-flame burners, at a certain elevation and within a certain radius, *increase* the power of the light—clear globes, about 6 per cent.; ground globes, about 9 per cent.; albatrine globes, about 23 per cent.; and German opal globes, about 21 per cent.

11. That reflectors greatly increase the power of the light, within a radius dependent on the shape and size of the reflector; the range in the experiments being from 52 to 92 per cent.

12. That screens at the base of an Argand flame cause a reduction in the power of the light, whatever be the size and form of the reflector.

It is especially noteworthy that when the shades are used on overhead burners, as is usual in practice, the loss of light occasioned by their employment is not nearly so great as that indicated by the early experiments of King and Storer, who measured only the light obstructed in a horizontal direction.

The shape of the shades is a matter of considerable importance. Globes with narrow openings at top and bottom were at one time almost universally used, but are now recognised as the worst form of shades for flat flames that could be devised. The contracted openings cause the globe to act as a chimney, the heated air and products of combustion escaping through the small opening at the top of the globe cause a strong draught of cold air to be drawn through the narrow opening at the bottom and brought in contact with the flame, with the result that the flame is constantly

flickering, and, owing to the cooling action of the current of air, emits less light.

In some cases the shade is made with a more open top, while the narrow opening at the bottom is retained. Such shades are less objectionable than those with a narrow top, but still cause flickering of the flame, and are not so good as those with an opening 4 in. or

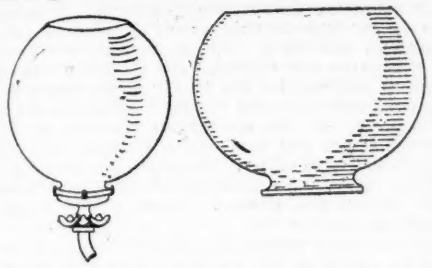


*Fig. 32.—Flat-flame Shades of Bad Shape.*

5 in. in diameter at both top and bottom. Two of the old forms of shade are shown in fig. 32, while more modern shapes, with large

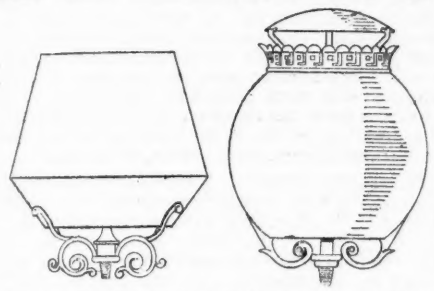


*Fig. 33.—Flat-flame Shades of Good Shape.**

openings at top and bottom, are shown in fig. 33.

*Holophane Shades.*—A new type of shade, designed by Psarondatri and Blondel, has been placed on the market under the name of the "Holophane" globe or shade. (Fig. 34.)

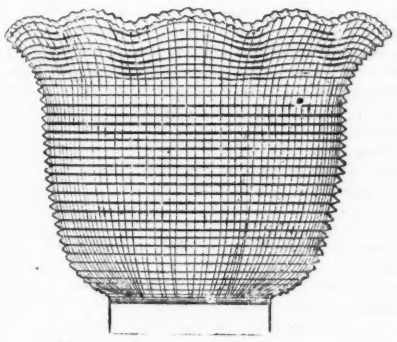


*Fig. 34.—Holophane Shade.*

The globe is made of clear glass, and the exterior side of the shade has horizontal prismatic lines running round it, while the interior has vertical prismatic lines. The horizontal prisms are moulded to deflect downwards some of the light which would otherwise be thrown against the ceiling, and thus more light is obtained in a downward direction when a holophane shade is used than when the flame or mantle is employed in a naked condition. The presence of the vertical prisms causes the light to be more evenly distributed over the shade than it would be if the horizontal prisms only were present. Professor Lewes has published the following table of results which he obtained with holophane and other shades placed over a Welsbach ordinary burner with chimney. The figures represent the average gain or loss of light due to the use of the shades when the objects to be illuminated are situated (as in ordinary use) at angles varying between the horizontal and 45 deg. below it :—

*Percentage Gain or Loss of Light Due to the Use of Various Shades with a Welsbach Mantle.*

| Shade. | | |
|---|---|---|
| Holophane—Tulip shape | Gain of | 12·3 p.c. |
| " Conical shape | " | 13·1 " |
| " Conical " pink | " | 1·1 " |
| White opal globe | Loss of | 7·5 " |
| Ground glass globe | " | 12·4 " |
| Frosted glass—Tulip shape | " | 11·2 " |
| Frosted glass—Pink | " | 23·2 " |
| Pink opal globe | " | 34·1 " |

* The expression "good shape" refers, of course, only to the practical suitability of the shape.

The Holophane globes do not, of course, possess the power of generating light, but merely deflect downwards upon the table and floor some of the light which would otherwise be thrown in an upward direction. They are manufactured in all shapes and sizes, and are equally suitable for use with coal gas and acetylene flames, or for incandescent gas lights.

*"Jena" Bulbs for Incandescent Gas Lights.*—Instead of using an ordinary cylindrical chimney with the Welsbach "C" or "York" burners, the chimney known as the "Jena" incandescent gas bulb, introduced into this country by Messrs. Falk, Stadelmann, & Co., may be employed. This bulb (fig. 35) has a number of holes around its lower circumference, which should be on a level with the top of the burner when the bulb is placed in position. Two or three holes are also made in the upper part of the bulb for the escape of the products of combustion. A small brass cone is slipped over the burner head and forms a base-plate for the bulb, so that no current of air can flow upwards to the flame. The air required for combustion (other than that drawn into the Bunsen tube of the burner in the usual manner) flows to the flame in a lateral direction, through the side holes. The bulbs are manufactured at Jena of a glass capable of withstanding great heat and sudden changes of temperature without injury.

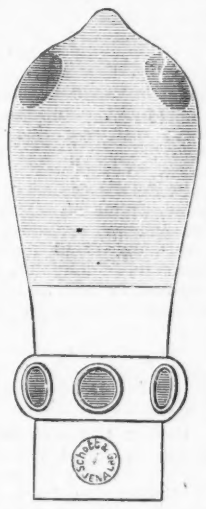


*Fig 35.—Jena Bulb.*

It is usually found that an appreciable increase in the intensity of the light emitted by the mantle is obtained by adopting this device, and the mantle is protected from draughts and dust to a greater extent than when chimneys of ordinary shape are used. Glass screens are manufactured in a variety of patterns to surround the lower part of the bulb, and the bulb has then a very pleasing appearance. These "Jena" bulbs are not, of course, intended to be used with the chimneyless burners.

*Chimneys.*—Chimneys are required with Argand burners and with certain descriptions of incandescent burners, because the flames from these burners would otherwise be of long, irregular shape and would be too unsteady for lighting purposes. The gas issuing from the burner-head under low pressure does not induce sufficient air to flow towards it to cause oxidation to proceed with the required speed, and the flame becomes elongated owing to the greater distance it has to travel before meeting with the volume of air necessary for complete combustion. Immediately a chimney is placed upon the burner an upward current of air comes in contact with the flame, and causes combustion to take place more readily, with the result that the flame becomes shorter and more rigid. The proportion of light obstructed by glass chimneys varies with their thickness and colour. It is impossible to ascertain the proportion obstructed by a chimney of the best quality, because the burner cannot be used without a chimney of some description, but an approximate estimate can be obtained by reference to the experiments of Hartley and Storer previously mentioned. Chimneys made of glass rods have the advantage of causing better diffusion of the light than plain glass chimneys, but this is counterbalanced by their greater liability to break and the greater difficulty experienced in cleaning them.

Mica chimneys are extensively used for incandescent burners, and have the advantage of being practically unbreakable, but they obstruct a considerable proportion of the light. Chimneys made of mica of inferior quality are liable to become ragged and unsightly and to obstruct fully 25 per cent. of the light from the mantle or flame, but a chimney of good quality will remain in good condition for an indefinite period, and should not obstruct more than 15 per cent. of the light.

*Reflectors.*—The object of reflectors is to obstruct the passage of light thrown in those directions in which it is not required, and to send it into the field to be illuminated. Mirrors and polished metals are excellent reflectors but bad diffusers of light, and are not agreeable for indoor illumination, although most valuable when the light has to be concentrated into one strong beam, as in searchlights.

Reflectors made of opal or thin porcelain have a much more pleasing effect for indoor use, and may increase the light thrown in any particular direction by fully 60 per cent. The angles of inclination of the sides of reflectors were at one time very frequently made too acute, a portion of the light from one side of the reflector being thrown upon the opposite side, instead of upon the object to be illuminated, but the advantage gained by inclining the sides at more obtuse angles is now generally recognised.

The most agreeable form of light is that obtained entirely from diffused reflected light, both the sources of light and the reflectors being entirely concealed from sight. This method of lighting is extravagant, but where the ceiling is white and the walls are covered with paint or paper of a light tint the cost need not be prohibitive.

*Guards for Naked Flames.*—In many cases where naked flames are in use the risk of fire may be materially reduced by the employment of wire guards (fig. 36). When the flames are

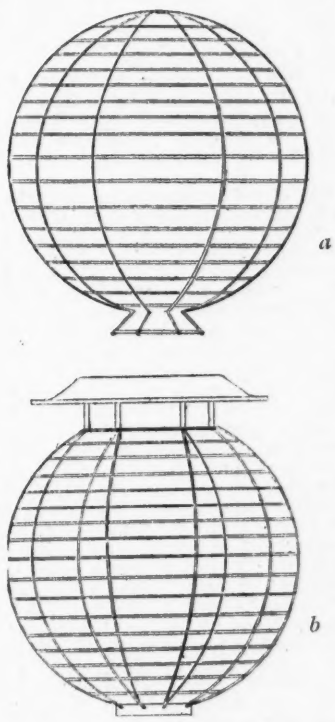


*Fig. 36.—Guards for Naked Flames.*

*a.* Without top-plate.
*b.* With top-plate.

less than 3 ft. from the ceiling the wire guards should be provided with covers of sheet metal.

## QUEENSLAND FOREST TREES.

THE following information in regard to Queensland forest trees is forwarded to us from the office of the *North Queensland Herald*, and we give it on the authority of that journal, as it may be of interest to some of our readers :—

Amongst the hardwoods, where strength and durability are required, those known as Ironbark take first rank. Of these there are severa kinds, the best being obtained from *Eucalyptus siderophloia*, of which there are two kinds of wood, one red and the other a brownish-grey, both excellent timbers, though the red is the favourite ; *E. crebra*, or the Narrow-leaved Ironbark, which has a greyish wood, very strong and durable ; and the Palmer River Ironbark, better known by the lemon-like fragrance of its leaves, from which it received its local name, than as a timber. The wood of this last, though very hard and of a rich red colour, is usually small and pipy. The trees known as Stringybarks supply excellent timber for sawing and splitting ; the kinds cut under this name are usually *Eucalyptus acmenioides* and *E. eugenioides*. Nearly resembling these in bark are the trees sometimes called Turpentine (*E. microcorys*), a very hard, strong, durable timber ; *E. Baileyana* and *E. resinifera*, two excellent timbers with a fibrous bark, from which circumstance they are at times known as Stringybarks.

The timber generally known as Gum is furnished by those Eucalypts which annually shed their barks,

as the Blue Gum (*E. tereticornis*), the Poplar Gum (*E. platyphylla*), the Grey Gum (*E. saligna*), the Spotted Gum (*E. maculata*), the Woollybutt (*E. botryoides*), and the Moreton Bay Ash (*E. tessellaris*). The bark of the last two is persistent at the base. There are also several others called Gum-trees, but those noticed furnish the best timber. The so-called Box is a name under which several trees supplying good, useful timber are known, as Poplar Box (*E. populifolia*), Gum-topped Box (*E. hemiphoia*), Thozet's Box (*E. Raveretiana*), and also the Brisbane Box (*Tristania conferta*).

Two trees are designated Bloodwood. The Common Bloodwood (*E. corymbosa*) is only adapted for using whole, as it often contains cavities in the wood so full of gum as to render it useless for sawing; it is, however, the favourite timber, on account of its durable nature, for house-stumps, piles for bridges, and other works where it can be used uncut. The White Bloodwood (*E. trachyphloia*) is very similar, but the wood is of a lighter colour, and not quite so durable.

The hardwood of the Johnstone River is furnished by a species of *Backhousia*, *B. Bancroftii*. This is a very tall, erect tree, and so far as is yet known, the wood is both durable and strong, does not crack or warp, and is easy to work. The Broad-leaved or Paper-barked Tea-tree (*Melaleuca leucadendron*) the Mahogany—Tom Russell's Mahogany as it is sometimes called—(*Lysicarpus ternifolius*), and the Swamp Mahoganies (*Eucalyptus robusta* and *Tristania suaveolens*) are timbers of a high quality, though the last-mentioned is useless except under water, when it is extremely durable.

The hardest wood, however, of Australia is that of *Erythrophlæum Laboucherii*, a tree met with in North Queensland, from the Endeavour River to Normanton. The wood of this tree is a rich red in colour, and takes a high polish.

The softwoods in use are the Bunya (*Araucaria Bidwillii*); Moreton Bay or Hoop Pine (*Araucaria Cunninghamii*); Dundathu Pine (*Agathis-Dammara-robusta*); the She-pine (*Podocarpus elata*); and several of the *Callitris* under the name of Cypress Pine.

For cabinet and ornamental purposes the following are in high request:—Red Cedar (*Cedrela Toona*)—the Moulmein Cedar of the English market; Yellow-wood (*Flindersia Oxleyana*), and others of this genus, especially *F. australis*; Silky Oak (*Grevillea robusta*); Deep Yellow-wood (*Rhus rhodanthema*); Tulip-wood (*Harpullia pendula*); and Beech (*Gmelina Leichhardtii*), a tree attaining a great size. The wood of this last is in great request for verandah flooring and deck planking.

Other woods suitable for cabinet work are:—*Elæocarpus Bancroftii*, a tree with a firm, light sapwood and a quantity of very hard, prettily-marked heartwood, though perhaps its true value will be in its proving a substitute for the American *Lignum vitæ* in the manufacture of blocks, pulleys, &c., than as a cabinet wood; several of the *Evodias*, all having a white, pliable wood; the Satinwood (*Zanthoxylum brachyacanthum*), one of the most beautiful Yellow-woods known; *Geijera Muelleri*, a common tree in most Queensland scrubs, having a large quantity of beautifully-marked dark heart; *Siphonodon australe*, another scrub tree whose wood is nearly white, very much resembling ivory when polished; the Bean-tree (*Castanospermum australe*), growing a heart-wood somewhat resembling Walnut, but apt to warp in seasoning; the Queensland Ebony (*Bauhinia Hookeri*), a rich-coloured hardwood, very suitable for veneering; the Scrub Sandalwood (*Exocarpus latifolius*); the Australian Olive (*Olea paniculata*); and many species of *Acacias* commonly called Myalls or Wattles, and remarkable for their rose-like fragrance.

Handsome woods are produced by the "Dead-finish" (*Albizzia basaltica*), *A. canescens*, *Archidendron Vaillantii*, several of the genera *Terminalia*, *Maba*, *Grevillea*, *Hakea*, *Xylomelum*, *Stenocarpus*, and *Banksia*, the timber of the last five being known as Beef-wood; the Silky Oak; the Gulf-country Gutta-percha (*Excæcaria parvifolia*) is very prettily marked and conspicuous for its beauty; and the Thready-barked Oak (*Casuarina inophloia*).

## *GENERAL BUILDING NEWS.*

Additions to Training College, Lincoln.—The additions to this college were recently opened. The old buildings have been considerably improved, and a new dining hall, a new classroom, four governesses' rooms, and forty-six dormitories have been erected, accommodation now being provided for 104 students (83 resident and 21 day) compared with fifty-six a short time ago. The work has been carried out by Messrs. Wright & Son from designs of Mr. H. H. Dunn, architect, of Lincoln.

Hospital, Western Bank, Sheffield.—The rebuilding of the administrative block and out-patients' department of the Children's Hospital, Western Bank, has been commenced. The new building will be considerably larger than the houses which have been removed, and will face Western Bank and Clarkson-street. It will be of three stories. Entering from Clarkson-street, there will be a waiting-hall, 34 ft. by 23 ft., two surgeons' rooms, two examination-rooms, a dental room, a small operating theatre, and other rooms belonging to the out-patients' department. A room is provided for at once isolating infectious cases that may present themselves in the waiting-room. The house surgeon will have his rooms on the ground floor where will also be the matron's sitting-room, nurses' rooms, kitchens, &c., and the first floor will be occupied by the bedrooms of the nursing staff and servants. The work of building is expected to be finished in about twelve months, and the cost is estimated at 9,000*l.* The architects are Messrs. J. D. Webster and J. D. Webster, jun., of St. James-street, Sheffield.

Methodist School Building, Keighley.—Memorial-stones of this school were recently laid on the site adjoining West-lane chapel. The new building is for the greater part of one story. The central hall, 53 ft. by 32 ft., will accommodate 300 persons, and a gallery at one end will seat another 100. Ranged round the central hall are eleven classrooms, and there are an infants' room, 25 ft. by 16 ft., and a lecture-room, 40 ft. by 20 ft. There is also a library, 19 ft. by 11 ft., between the two front entrances, and a kitchen, 16 ft. by 13 ft., on the ground floor at the back. At one side the building will be run up to another level to provide two additional class-rooms, each measuring 20 ft. by 12 ft. 6 in. Externally the appearance of the edifice will be plain, in keeping with the chapel on the right. The cost of the building, excluding the site, but including the furnishing, will be about 2,500*l.* Messrs. Moore & Crabtree, of Keighley, are the architects, and the contractors are as follow:—Mason's work, Mr. Michael Sunderland; joiner's work, Mr. S. Foster; slater's work, Mr. W. Thornton, Bingley; plumber's work, Mr. Wm. Bottomley; plasterer's work, Mr. John Greenwood, Crosshills; painter's work, Mr. Frank Petty; heating apparatus (hot water on the high-pressure system), Mr. R. Rundle, Idle.

Parish Church, Hove, Brighton.—The new parish church at Hove was opened by the Archdeacon of Lewes on the 28th ult. It has been built of Sussex sandstone, and with stone from the quarries of Sir Weetman Pearson, M.P. The seating accommodation is for about 1,300, the build ng being 160 ft. long and nearly 80 ft. broad. The nave, including the transept, is 108 ft. long and 35 ft. wide, and is divided into six bays. The two western bays, opening respectively into the baptistry and the base of the tower, are marked by lofty and richly-moulded arches springing from clustered piers attached to the north and south walls. The next four bays open into the north and south aisles, and are each 16 ft. wide. The arcades consist of clustered piers, 17 ft. high, from which spring lofty pointed arches. Above these is the clearstory. The architect was the late Mr. Pearson.

School Buildings, St. Anthony's, Newcastle-on-Tyne.—On the 27th ult. the foundation-stone of a new infants' school was laid at St. Anthony's, Newcastle. The site is near the church, and the building will comprise a schoolroom, 73 ft. long and 55 ft. wide, with a folding screen and classrooms. It has other accessories, such as a cooking-room, &c. There will be a large playground about 100 yards in extent. Some 200 children will be accommodated. The architect is Mr. James Wightman Douglas, of Alnwick, and the builder Mr. W. S. Anderson, of Hunter's-road, Newcastle.

Chapel and School, High Wycombe. — The foundation-stone of this school was laid, on the 25th ult. The site of the new buildings is at the junction of Oakridge and Jubilee roads, with direct and near access from the main road to Oxford. The plans show that the schoolroom will be after the Late Gothic style of architecture. The building is to be of red brickwork with stone dressings, and the schoolroom will be 53 ft. 6 in. by 28 ft., accommodation being provided for 250 persons. There is also to be a classroom, 21 ft. by 13 ft.; and lobby and cloakroom facilities will be arranged, together with a scullery at the rear. The contract for the erection of the schoolroom is estimated at 1,377*l.* 8s., which includes the cost of erecting the boundary walls round the site. The architect is Mr. T. Thurlow, of High Wycombe, and Mr. J. T. Harris, of the same town, is the contractor.

Additions to Mansion, near Pitlochry, N.B.—Extensive alterations and improvements are being made to the mansion house at Dunfallandy, near Pitlochry, for Mr. D. Stewart Fergusson. The contractors are:—Mason, Mr. Charles Robertson, Pitlochry; joiner, Mr. A. B. Kennedy, Pitlochry; plumber, Mr. Buchanan, Dunkeld; plasterer, Mr. John Veitch, Pitlochry; slaters, Messrs. Campbell & Storrier, Pitlochry. Mr. A. G. Laskie, of Glasgow, is the architect.

New Buildings, Ascot Racecourse.—Work in connexion with the new buildings on Ascot racecourse has been commenced. The *Windsor Chronicle* remarks that the Royal stand will be situated between those of the Jockey Club and the Master of the Horse and the Lord Chamberlain, its position being similar to that which the old building occupied. The erection will be 70 ft. in length and 40 ft. high. Panelled balconies projecting from the front will overlook the course, and the verandahs above are to be covered with copper. The lawn will be reached by two curved staircases leading down from the principal tier, and sheltered by a canopy, also roofed with copper. The brick wall at the rear will be somewhat in the Queen Anne style, and will be provided with an ornamented iron portico, where the Royal or other visitors will alight from or enter their carriages. The Jockey Club stand will be placed next the Subscribers' private stand, which latter, as well as the clock-tower and grand stand, remain as they were. It is to be 56 ft. 9 in. in length and 54 ft. high, and will have a light iron roof for an awning and verandahs facing the Heath. Dressing-rooms and other apartments will be provided in the building, and there will be separate entrances for members and visitors. The third stand, which will be reserved for the Master of the Horse, the Lord Chamberlain, and others, is the largest of the group. It will be erected on the west of the Royal stand, and here Major Clements and the clerks will have offices. Staircases will lead to the Press stand, and accommodation will be provided for owners and jockeys. There will be several luncheon-rooms and lifts. The buildings, which will be constructed chiefly of iron and wood, will not be in line with the grand stand, as hitherto, but will be brought forward to an angle, so that the occupants might get a better view of the races as the horses come up to the judges' box. This will necessitate the course being altered, and instead of running in a straight direction to the Grand Hotel, it will be brought to a gentle curve. An effort will also be made to reduce the uphill gradient by the winning-post. In order to get the work completed by next June a staff of 500 or 600 men will be employed, and a large number have already been engaged. The men will work night and day, and to enable this to be done the electric light will be installed. The architect is Mr. C. W. Stevens, and the contractors are Messrs. Allen & Sons, of Kilburn.

St. Martin's Church, Roath.—This new church has recently been opened by the Bishop of Llandaff. It is of red brick, with stone dressings. The designs were by Mr. F. R. Kempson, of Cardiff. He was required to find accommodation for 1,000 persons; the site, which is short and broad, made this a difficult matter. It has been done by means of a broad nave and chancel under one continuous roof, with a wide aisle at the south side; on the north side is a narrow nave aisle and a slightly wider chancel aisle, which forms a side chapel. The chancel is raised above the nave, and will eventually be divided from it by a three-arch stone rood-screen.

Rectory, St. Mary Magdalene's Church, Dundee. — The new rectory, church halls, and gymnasium erected in connexion with the church of St. Mary Magdalene, Dundee, were opened on the 29th ult. The rectory occupies the front of the building facing Well-road. It is four stories in height, with large public rooms, the upper floors being occupied by the studies of the clergy, bedrooms, &c. The large hall is entered by two spacious staircases from Well-road, leading to a vestibule which extends the whole width of the building. From the staircases two flights of stone stairs lead to the galleries. The entrances are all fireproof. The hall is 72 ft. long by 50 ft. wide, with a platform at the west end, 19 ft. broad, and is capable of seating 1,300 persons. The roof is of partially open timber. Galleries run round the four sides, but it is intended at a future date to place an organ in the west gallery above the platform. On the west wall is placed a large shield bearing the arms of the diocese with mitre on the top. The columns supporting the galleries are relieved with small shields bearing heraldic devices illustrating the different sees of the dioceses of Scotland. The walls are also decorated at suitable points with oil paintings, as is likewise the vestibule, but owing to the spacious character of the walls there is ample room for more pictures than are yet available. A separate stair leads to the platform at the north-west corner of the hall, and is continued up to the galleries. At the south-west corner an outside stone stair, affording means of egress from the gallery, has been built for emergency purposes. There are thus four separate means of public exit from the hall. Lavatories and retiring-rooms for both sexes are provided both at the platform and at the main entrance. Underneath the large hall is a lesser one, capable of seating about 300 persons, and which will prove of great utility for small meetings. A special feature of the building is the gymnasium. This is 50 ft. long by 18 ft. wide, and 17 ft. in height. Entrance to the gymnasium is gained at the north side of the building. In common with the halls and rectory, it is lined throughout with pine, lit by electricity, heated by the low-pressure hot-water system, and ventilated by what is known as the natural system of ventilation. The total cost of the buildings, including the purchase of the site, has been about 3,000*l.* The designer was the late Rev. Edward Sugden, who was for some time Rector of the Church at Coupar Angus. His designs have been carried out in the office of Mr. Robert Blackadder, of Dundee, under the supervision of Mr. David Allan. All the contractors were local firms, namely:—Masons, James Powrie & Son; joiners, D. P. How & Son; plasterer, A. M'Ritchie; painters, Pirie & Croom; slater, Laburn & Son; ironwork, Beath & Keay; plumber, David Brown; electric lighting, heating, grates, &c., G. H. Nicoll & Co. Mr. Robert Low was clerk of works.

## SANITARY AND ENGINEERING NEWS.

BARROW-IN-FURNESS WATER SUPPLY. — The Barrow Corporation Water Bill has now received the Royal assent. The scheme is one for taking a supply from the river Duddon at a point about four miles above Duddon Bridge. The area of the watershed above the proposed intake is about 12,000 acres, and is situated on the lower silurian formation. It is very mountainous, the altitudes ranging from 250 ft. to 2,625 ft. above the level of the sea. The average rainfall is 90 in. per annum. The scheme includes the raising of the level of Seathwaite Tarn by the construction of a masonry dam, so as to enable the Corporation to keep in reserve a quantity of water equal to 450 million gallons for giving compensation to the river in times of drought. The pipe line from the intake works to Barrow will be 17½ miles in length. The water is of fine quality, and is suitable for domestic consumption and trade purposes. The Borough Engineer, Mr. W. H. Fox, is the engineer for the scheme.

WATER-TOWER, WIVENHOE.—On the 24th ult. the foundation-stone of this water-tower was laid. The general water scheme comprises a bore-hole, which has been made in chalk to a depth of 130 ft. It yields 9,000 gallons per hour, and the water has been pronounced by Dr. Thresh, the county analyst, to be excellent. The boring is situated in the lower level of the town, near Queen-street, and the water is to be pumped direct to the water-tower in course of erection on the higher part of the town at the Cross. The tower, 55 ft. high, will be surmounted by a tank with a capacity of 50,000 gallons. Service mains are to be laid all over the district. A bore-hole was first tried near the water-tower, but the water proved to be too saline for domestic purposes. The total cost of the scheme will be 6,500*l*. The contractor is Mr. H. Shardilow, and Messrs. Sands & Walker, of Nottingham, are the engineers.

WATERWORKS, WISHAW, N.B.—On the 19th ult. the new waterworks, which have been constructed for the burgh at a cost of upwards of 100,000*l*, were formally opened at Peden, in the parish of Crawford. The water, which is of excellent quality, is drawn from three burns—the Potrail, Potrenick, and Peden—rising in the Lowthers, on the borders of Dumfriesshire, and pipes have been laid capable of delivering 2,220,000 gallons per day. Mr. W. R. Copland, of Glasgow, was the engineer.

ELECTRIC LIGHTING, LONGTON.—The electric lighting station erected by the Longton Corporation was opened on the 25th ult. The site is included in the gasworks premises, and the cost of putting down the plant, &c., has amounted to about 21,000*l*. The generating plant, which has been installed by the Electric Construction Company, Wolverhampton, consists of two E. C. C. Bellis generators of a normal capacity of 145 kilowatts each, with provision for a third in the existing station. The steam required for the works is provided by two boilers of 1,000 horse-power. The accumulators are of the chloride type. The normal discharge rate of the battery is 40 kilowatts for a ten-hour period, but in case of emergency the battery could be discharged at the rate of 200 kilowatts for one hour. The works have been designed and carried out by Mr. W. Langford, the Corporation gas manager and electrical engineer.

## STAINED GLASS AND DECORATION.

WINDOWS, BRECHIN CATHEDRAL.—Several valuable stained-glass windows have recently been presented to the restoration committee of Brechin Cathedral, and they are described as follows in the *Dundee Advertiser*. In the restored chancel fourteen stained-glass windows have been put in, five on each side and four in the big east window. The subjects on the north side of the chancel represent the five principal scenes in our Lord's life before the commencement of His public ministry. Those on the south side depict the five principal scenes of that ministry. In the north division of the east window there is a figure of Christ as Prophet, in the centre division the figure of Christ as Priest, and in the south division the figure of Christ as King. The first window on the south side of the chancel represents the Nativity—in the top the angels appearing to the shepherds, in the centre the manger at Bethlehem, and at the foot the three wise men coming to worship. The subject of the second window on the same side is the flight into Egypt—at the top an angel appearing to warn Joseph and Mary, in the centre the massacre of the Innocents, and at the foot Joseph and Mary with Jesus on their way to Egypt. In the next window is depicted at the top the presentation of our Lord as a babe at the Temple, in the centre our Lord amongst the doctors, at the foot our Lord in the carpenter's shop. The subject of the next window is the Baptism—in the top there is a representation of John the Baptist baptising our Lord, in the centre a figure of Christ alone, and underneath the figure of John the Baptist pointing him out to some of his disciples, and saying, "Behold the Lamb of God that taketh away the sin of the world." The Temptation forms the subject of the next window—in the top our Lord is seen in the wilderness amongst wild beasts, in the centre He is on the top of a high mountain looking down upon the three great kingdoms of the then known world—Babylon, Rome, and Egypt—and at the bottom Christ with the angels ministering to Him. In the first window on the north side of the chancel there is a picture of the Transfiguration, and underneath the demoniac boy being healed. The second window on that side deals with the scene in Gethsemane—on the top Christ is seen praying with the angel ministering to Him, in the centre the three disciples asleep, and at the foot Judas kissing Him. The Crucifixion—a figure of Christ upon the cross, with His mother and the Magdalen—is the subject of the next window. The succeeding one deals with the Resurrection—at the top an angel at the empty tomb, in the centre Christ and Mary in the garden, and at the foot Christ with His disciples at Emmaus. The Ascension is the subject of the next window—in the upper part a figure of our Lord ascending, in the lower part the figure of an angel saying to the disciples, "This same Jesus shall come in like manner as ye have seen him go." The rose window at the east end bears "Agnus Dei." These windows are all the gift of an anonymous donor. They have been executed by Mr. Henry Holiday, of London, while the scheme was prepared by the Rev. A. D. Tait Hutcheson, of the Cathedral. In addition to these, two fine stained-glass windows have also been presented to the church. One at the east end of the north aisle represents Isaiah and John the Baptist. The other window, which has been placed at the east end of the south aisle, portrays the figures of St. Peter and St. John. These windows were executed by Messrs. Stephen Adam & Sons, Glasgow, after a design by Mr. William Gauld, of Glasgow.

WINDOW, ST. PETER'S CHURCH, SHEFFIELD.—On the 29th ult. a window erected in the baptistry at St. Peter's Church, Abbeydale, Sheffield, in memory of the late Mr. William Turner, was unveiled. It is by Messrs. Jones & Willis, of Birmingham, from the designs of Mr. Joseph Norton, architect, of Birmingham. The subjects dealt with in the three lights are Christ blessing the children, the Presentation of the infant Saviour in the Temple, and the youthful Samuel. Below is a suitable inscription.

## FOREIGN.

FRANCE.—M. Denys Puech, the sculptor, has, by the aid of photographs only, modelled a fine bust of the Czar, which is to be sent as a gift to the Empress of Russia from the French President.—— The jury in the competition opened for a new church at Domfront, has awarded the first premium to M. Jardel, of Suresnes; the second to MM. Berger & Maistrasse, of Paris; and the third to M. Pignard.——Sixty-seven architects have competed for the rebuilding of the Church of St. Germain, at Flers-de-l'Orne. The first premium has been awarded to M. Forget; the second to MM. Berger & Maistrasse; the third to M. Bréasson. The estimated cost of the work is 700,000 fr.

## MISCELLANEOUS.

ROMAN REMAINS IN HAYLING ISLAND, HANTS.—With Roman settlements in Hampshire, Sussex, and the Isle of Wight, it is not strange that tradition should have come down to us of the existence of Roman remains in Hayling Island, and fixed the site at a spot which the excavations of Mr. Talfourd Ely have shown to be correct. In the north part of the island, a little to the west of North Hayling Church, is the Towncil Field, part of a larger area at one time held in allotments, and here from time to time coins have been turned up by the plough. In this field there was a slight elevation, manifestly artificial, and, when examined carefully, it was easy to trace, by the different colour of the crops, the outline of the foundations below, just as at Silchester, the *insulæ*, or blocks, may be detected by the same criterion of a less fertile yield over the stonework. In 1897 Mr. Talfourd Ely commenced operations, which have been carried on year by year since that time. Though he has been rewarded by no very valuable "finds" in the way of curiosities or museum specimens, he has had the good fortune to establish the fact that here stood a very early Roman building of large size, the foundations of the outer walls being, in round figures, 150 ft. by 170 ft. As the work progressed, it became evident that here was more than a villa in the sense of a country residence. The outer walls seem to have enclosed not only the house but outbuildings, such as sheds or barns. The living-rooms were indicated by the presence of painted wall plaster, roof tiles, and light and dark *tesseræ*, though nothing was found that could in any way compare with the fine pavements unearthed at Brading, Silchester, and many other places. This is probably due to the early date of the work, which is approximately fixed at the end of the first century of our era. A bronze coin of Domitian was found during the work. Later coins have also been met with, but early coins seem proportionately commoner here than in most villas. Year by year the excavations have gone on and thrown more light on the character of the building, which will no doubt be described fully by Mr. Talfourd Ely when the work is finished. Last year a chamber was uncovered, the floor of which was of small flints covered with trampled clay, set with *tesseræ* so thickly that more than eighty were picked out from the space of a square yard. The building must have been warmed by hypocausts, for remains of the furnace and flue-tiles were found. A fine specimen of Romano-British work in the shape of a circular bronze brooch was discovered. The groundwork is blue enamel, still brilliant, with a central raised circle, surrounded by smaller ones, each with a depressed setting for a stone. This year a corridor 30 ft. long, another about 40 ft., and a room 15 ft. by 20 ft. were uncovered, so that it is safe to conclude that the house itself was of considerable size. An interesting discovery consisted of a number of fragments of terra-cotta, with deep fittings. Mr. Ely believes that the pieces are to be accounted for by the building having been burned down. The terra-cotta probably served as a dado, or wall lining, as many of the pieces have a projection at the back, apparently for fastening to the wall. The other remains include nails, a Roman key, a razor blade or knife, black Romano-British pottery, and a few pieces of red Samian ware. No human remains were met with; the bones belonged chiefly to domestic animals, and there was more than the usual quantity of boars' tusks, some of large size.—*Standard*.

BRITISH FIRE PREVENTION COMMITTEE. — A silver portrait medal accorded by her Majesty, the German Empress, in connexion with the Berlin Fire Congress of June last, has been presented to the executive of the British Fire Prevention Committee, as a mark of appreciation for the services rendered by that body in the demonstration of scientific and economic aspects of fire protection. It will be remembered that a deputation of the committee comprising Mr. Edwin O. Sachs (chairman), Mr. Ellis Marsland, Mr. F. R. Farrow, and Mr. C. E. Goad, accompanied by the secretary and engineer, visited Berlin in the summer, and that an important exhibit of technical models and photographs was lent to the German Authorities for the exhibition held in connexion with the congress.

ALTERATIONS, ST. GILES' CHURCH, CRIPPLEGATE.—Upon the union of the benefice of St. Bartholomew, Moor-lane, with that of St. Giles, Cripplegate, it was decided to remove to the latter edifice a number of historic appointments which formed an interesting feature of the first-named church. Though itself a comparatively modern edifice, St. Bartholomew's, Moor-lane, contained not a few valuable relics which were recovered from the church of St. Bartholomew-by-the-Exchange at the time of the Great Fire. The original church was rebuilt near the Bank in 1438, destroyed by the historic conflagration, and replaced by Wren. Then, the historian informs us, "the materials of the old church were sold by auction in 1841 for 483*l*. 15*s*., the south wall and a chapel being reserved to be built into the Sun Fire Office, as was also some of the carved masonry, the old pulpit, the organ, and other woodwork, which were preserved in a copy of the old tower and church erected in 1849-50 by Professor C. R. Cockerell, R.A., in Moor-lane." When it was decided that the Moor-lane edifice should at last disappear for ever, the authorities of Cripplegate obtained a faculty authorising the removal of the several interesting relics to St. Giles'. For some months past the work of re-erection has been in progress by Messrs. W. H. Lascelles & Co., of Bunhill-row, under the direction of Mr. F. W. Jackson, the clerk of works, and now it is nearly complete. The result of the improvement has been to provide an ante-chapel at St. Giles', to the north of the chancel. Here the reredos from Moor-lane has been placed. It is composed of carved wood, attributed to Gibbons, and contains two coloured panels representing Moses and Aaron. The communion-table is of elegantly-figured marble. On the wall, to the north of the reredos, has been fixed another specimen of carving, in which are apertures for two panels. The reading-desk has also been removed. The tiled floor of this former chancel has been relaid, and the partition rails have been made from the choir stalls in use at St. Bartholomew's. The removal has been carefully carried out, and the result is to add in no small degree to the beauty of Cripplegate's parish church. When "the four shoppes" disappear, the Great Fire commemoration window is also to be fitted up at St. Giles'. Apropos of the improvements, it is interesting to note that the same firm have had in hand the re-erection of a house adjoining the church. In order to establish a sound foundation it was necessary to burrow some 27 ft. below the chancel of St. Giles'. This necessitated the temporary removal of a large number of coffins, and, judging from the spot at which the remains of Milton are believed to rest, it is not improbable that the body of the poet was among those thus disturbed. It is significant that the whole of the coffins bore inscriptions, with one exception, and that in this instance the body was enclosed in two shells. The remains have since been restored to their original positions.—*City Press*.

STREET STATUES, HULL.—The *Yorkshire Post* states that at a special meeting of the Hull Corporation City Improvement Committee, held at the Town Hall on the 25th ult., the Mayor approached the members as to their willingness to take another statue out of the Town Hall for the purpose of decorating the new streets. Already the statue of

William de la Pole, the first Mayor of the town, has been placed at the junction of Jameson-street and King Edward-street. Now, the Mayor suggests that another stone should adorn the open space at the junction of Jameson-street and Savile-street, and he mentioned that of Andrew Marvell, a marble effigy sculptured by Mr. Keyworth, and presented to the Corporation in 1867. The Committee were unanimous that the suggestion should be carried out.

A New Gardening Paper.—*Garden Life* is the title of a new paper of which the first issue has been sent to us, and which is described in its heading as "a practical journal for amateur gardeners." Judging from the contents of the first issue, it seems likely to be of use to those for whom it is intended. "My Suburban Garden: How it has been made Beautiful," is an article the title and subject of which appeal to many who have a small garden and wish to make the most of it.

## *LEGAL.*

### BUILDING HOUSES—A CURIOUS CASE.

At the City of London Court on the 25th ult., before Mr. G. Pitt-Lewis, K.C., Deputy Judge, the assignee of Mr. William Purkis, timber merchant, sued Messrs. Nicholson & Son, 105, Cheapside, for 68*l.* 7s. for timber supplied. Mr. Abinger, plaintiff's counsel, said that the defendants had been building sixteen houses in Brook-road, Walthamstow, and the timber sued for was used. The defendants entered first of all into a contract with one Palmont, sen., who was unable to carry out the contract. In the month of January they entered into a contract with Palmont's son. He had no capital, and an agreement was entered into by which they undertook to pay him the sum of 1,600*l.* for the completion of the houses. As the young man had neither capital nor plant it was obvious that he could not carry out the agreement without being financed. Palmont, jun., was paid weekly wages for carrying out the work as the foreman bricklayer for the defendants. The plaintiff's case was that the timber now sued for was ordered by Palmont, jun., on the authority of the defendants. Other goods had been supplied to the houses, and had been paid for by the defendants, who now, however, refused to pay the timber bill. All the prices of the timber and other goods ordered for the buildings were submitted for the approval of the defendants before the orders were given. That showed that the agreement, which had been prepared in solemn form, was really bogus. Evidence was given by the plaintiff and Palmont of the goods having been supplied and used. Palmont, jun., said that nobody had paid for the goods. The defendant's case was that Palmont, jun., agreed to finish the houses for 1,600*l.* The orders for the timber now sued for were given by Palmont, and not by the defendants. There was no truth in Palmont's story that he had been paid weekly wages, and that he was acting as the servant of the defendants. He had received 1,800*l.* in all for carrying out the contract. It was true that the defendants had guaranteed some of the orders which Palmont gave, but in all those cases they had paid the accounts themselves. No such guarantee was given in the plaintiff's case, and no liability was resting upon the defendants. The Deputy Judge delivered judgment at great length, and said that the case was one of considerable importance, not only because of the amount in dispute, but because of the principles involved. The defendants' contention was that the work performed by Palmont had been done under a contract, and that, as that was the case, the timber must be paid for by him. The Deputy Judge said he could not hold that there was a contract at all. It was true that an agreement had been prepared in solemn form, and that it was sent to Palmont for approval by the solicitors, who were the brothers to the defendants. He did not think that Palmont had the ability to understand the matter at all. In his view, Palmont was not an independent contractor, and the relationship between the defendants and him was that of master and servant. That being the case, judgment must be entered for the plaintiff for the amount claimed.—*City Press.*

### ALLEGED INTERFERENCE WITH A PARTY WALL.

The case of Sadler *v.* Fairclough came before the Lord Chief Justice of England, sitting as Vacation Judge, on the 2nd inst., on a motion by the plaintiff for an interim injunction to restrain the defendant from interfering with a party wall.

Upon the case being called on, counsel for the plaintiff in support of the motion asked that the case might stand over for a fortnight, as there was a prospect of the parties being able to come to terms.

His Lordship: You had better take three weeks.

The learned counsel stated that nobody now appeared for the defendant, but he had given an undertaking that if the case stood over for a fortnight he would not, in the meantime, further interfere with the party-wall in question.

His Lordship: Very well. I will agree to the case standing over then.

### BUILDING DISPUTE SETTLED.

The case of Goldsworth *v.* Masters & Richards came before the Lord Chief Justice of England, sitting as a Vacation Judge, on the 2nd inst., on a motion by the plaintiff for an interim injunction to restrain the defendants from building until the trial so as to interfere with the plaintiff's ancient lights.

Mr. P. Chitty said that the defendants were willing to treat the motion as the trial of the action, and submit to a perpetual injunction.

Order accordingly.

## RECENT PATENTS:

### ABSTRACTS OF PATENTED INVENTIONS.

9,989.—A Fire-proofing Composition: *Huelsberg & Co.*—A composition for rendering wood, fabrics, paper and other substances fireproof consists of the double salts of ammonia and magnesia, or ammonia, and iron, zinc, and so on. It is heated to a temperature of about 70 deg. C. before it is pumped into the impregnating vessel within which it is to be maintained at 98 deg. C. For wooden articles, boracic acid is added to the mixture.

10,015.—Ventilating and Cognate Appliances: *T. Walton and J. H. Walton.*—The air in weaving-sheds is humidified with steam from untainted water with an apparatus that causes steam circulating through pipes to heat water in a cylinder; the steam is drawn away from domes that it may mingle with the air which is forced through pipes, and is then conveyed to the spaces under treatment. For purposes of ventilation the steam supply should be cut off. An injector which supplies the feed-water from a tank is started or stopped by the descent or ascent of a float that acts upon a valve arranged in the steam-supply pipe.

10,039.—An Enamel for Fictile Ware: *G. Appiani.*—An enamel, which is free from tin, consists of an admixture of calcined sand, about 19 parts; minium or litharge, 18 parts; kaolin, 28 parts; common salt, 4 parts; soda, potash, or other alkalies, 3 parts; and quartz or calcined marble, 28 parts.

10,114.—A Circular Saw Guard: *J. E. K. Long.*—By this invention the wood which is to be sawn works the saw-guard automatically. The top of the saw is covered with two semicircular plates affixed to a slide which will be raised with a cord from the end of a lever against which the wood is forced forwards, the guide of the slide being pivoted to a radial bar adjusted about the pillar; a spring lifts the lever, so as to draw the sliding bolt backwards, as soon as the rear end of the wood has passed beyond the end of a lever pivoted beneath the bench, whereupon a curved guard will ascend and cover the saw behind the wood. The guard may upon occasion be worked by hand.

10,168.—Chimney-tops and their Fittings: *E. Milburn.*—For a chimney-top is devised a slotted drum, set vertically, around which are hung louvres upon bights that project from a wire frame, which is disposed around the drum beneath the cover which carries the vanes; a middle bearing upon brackets carries the spindle that reaches up to the top of the up-take; the pointed end of the spindle rests upon a step in an oil-bath, and the spindle is further supported with a series of loose wide rings, each of which consists of a pair of discs having a vulcanite disc between them, the rings being also kept apart from one another with loose tube sections.

10,180.—Blocks for Building Purposes: *J. C. Sellars.*—Hollow blocks for walls and floors are fashioned with interlocking ribs and recesses, and with other recesses that will take horizontal T-iron bars to be tied and clamped together; for stiffening purposes tubes or battens are passed vertically through the blocks; for quoins and buttress or bonding blocks, recesses fashioned transversely in the ribs will take the similar edges of the blocks next adjoining. The blocks consist of cement or lime mixed with ground refuse-destructor clinker, and will serve for tiles when they have been cut across lengthwise. Numerous forms and adaptations of the blocks are specified.

10,191.—A Junction Piece for Gas Pipes and Burners: *T. Boerlage.*—A capsule and tube having indiarubber attachments constitute a connexion-piece that can be fitted on to a split-burner by drawing the rubber over the burner; in the case of a Bunsen burner a rubber ring is used for closing the air-holes when the indiarubber piece has been adjusted in its position.

10,218.—Moulding of Bricks, Pipes, Tiles, &c.: *H. Coiffier, E. Vieville, and A. Majeste.*—Concaved, flanged, and eccentrical screw-blades, that are bolted in pairs on to plates secured to hubs of a squared shaft, press the clay from the mixing cylinder through a grating and a die-plate or mouth-piece, stones, nails, and other hard substances being pressed into boxes provided with doors. The shocks produced by those extraneous substances are reduced by means of knives or arms upon the cylinder and the shaft which will receive a small vertical motion. A fixed arm prevents the blades from carrying the clay around, and one of the arms carries a scraper or rake which is pressed against the cylinder. In order to impart a slight rocking movement to the steel screw-blades, each of them is bolted on to a plate with two bolts, whereof one is inserted through a slot and the other through a round hole in the blade. For hollowed goods, a cross-bar in the die-box carries a support on to which a core or mandrel is bolted; as it is expelled from the die the plastic body is held up with an arm upon the front of the core, whilst a travelling band, divided into lengths, takes the column as it emerges from the die.

10,244.—Ventilating Apparatus: *J. H. Robinson.*—The inventor seeks to minimise the disadvantages attaching to cast air-grate ventilators wherein the moulding and casting limit the extent to which the inclined cross-bars will overlap one another. He fashions the cross-bars separately from the frame and then sets them in their places; in one form of the contrivance he affixes them on to extended cheeks upon the frame; in another he disposes the cross-bars upon the cheeks and secures them with a rod which has projections that will bear upon the bars and is fastened with a nut.

10,254.—A Lifting-jack: *J. C. Crellin.*—The forked end and the other end of a girder are, in each instance, sustained by means of a cross-head worked upon a screw in standards, the load to be moved rests upon one or more of the girders; spur-wheels, a shaft, a worm-wheel, and a worm upon a hand-driven cross-shaft, communicate motion to the main middle shaft. It is arranged that the worm upon the cross-shaft can be disengaged, whereby one may apply a crank directly to the upper end of the shaft and so lower the cross-head rapidly.

10,266.—A Water-Supply Tap: *J. Shanks and R. Burnside.*—The tap is intended for use as a flushing-valve for water-closets, a ball-and-float valve, and a measuring valve for tanks and cisterns. It comprises a valve which slides within a chamber that is joined to the inlet with a passage, and to which a conical facing is affixed. Upon the valve is a seat for a disc-valve mounted upon the spindle; pressure upon the top of the valve keeps it shut under normal conditions, but when one forces the spindle upwards water will escape through, the disc-valve being opened, thereupon the valve is raised by means of a shoulder upon the spindle, a plug-valve serves to control the amount of water supplied to the chamber; a float-lever may be used for the working of the spindle, and the valve can be utilised for supplying measured quantities of water to a cistern, or for flushing purposes.

10,275.—An Apparatus for Kilns: *G. Horn.*—Cold air is admitted into kilns after the annular kind through a main pipe and branch pipes having regulating-flaps, a cone-pulley driving the ventilator.

10,297.—Means of Preserving Wooden Paving-blocks, Sleepers, &c.: *A. Bevier.*—After the blocks have been subjected to a temperature of 212 deg. in closed receivers during from one to five hours, the temperature is increased to from 250 deg. to 500 deg., and an air pressure varying from 100 lbs. to 200 lbs. per square inch is exerted; then is employed a preservative mixture (heated to 300 deg. at a highest pressure of 400 lbs. per square inch) of creosote, oil, resin, and formaldehyde. As the blocks are suffered to become cool under a lessening pressure they are treated with resinate of lime and turpentine. The invention comprises apparatus for the processes specified, including a furnace for melting the resin, tanks, pumps, air-compressors, &c.

10,340.—Floating Baths: *J. C. Dodd.*—The structure comprises a frame built with girders and having air-tight removable tanks beneath, a platform above which is a promenade-deck, and an adjustable bottom, composed of planks interspaced, which can be lifted and lowered.

10,361-3.—Appliances for Electrical Lamps: *J. A. Halford.*—Two conductors formed of fine copper wire wrapped in an asbestos braiding and a penetrable asbestos or cotton material, constitute the cable. A shoulder or bead, against which the fingers may be pressed as one puts the lamp into its holder, is fashioned upon the cap of the lamp, and the sharp edge of the cap enters the support and thereby prevents the accidental flow of water to the connecting-spikes. Pieces for connecting lamps to ceiling-strips have pins or arms that make contact with the conductors, and may either be rigid and be turned round in recesses to bear against the contacts, or be laid in grooves in a strip, the lamps having spring arms that bear against the conductors. Confer also No. 18,414 of 1899 for the special lamps cited.

10,370.—Manufacture of White Lead: *F. J. Corbett.*—Finely-divided lead or lead oxide is dissolved within an air-tight receiver by the application of acidulated aldehyde, alcohol, or alcohol and water. The carbonate or white lead is precipitated under pressure and agitation by the introduction of liquid carbonic acid or carbonic acid gas.

10,383.—An Appliance for Sketchers' Use: *H. Trier.*—The lower portion of the sketching-box has a hinged lid, a hole for the brushes, and a thumbhole, whilst its upper surface (together with a sliding lid) serves for a palette; thin wooden panels are secured with pivoted clips in grooves cut in the lid.

10,384.—A Potter's Lathe: *A. Richard and G. de Franceschi.*—The lathe is devised for making a bowl having a figured polygonal rim, a smooth polygonal body, and a rounded base. The base is

shapened with a profile tool mounted upon a horizontal axis on to which the main jolley lever is pivoted. The profile tool for the body of the article is mounted upon another lever, which is pivoted to a vertical pin of the jolley lever, and has a vertical rod that engages with the cam-groove of a ring upon the table or wheel. A spring draws the two levers together in a horizontal guiding-fork. On a bent portion of the second lever is loosely mounted a third lever, which is provided with a profile tool which fashions the corrugated or escalloped rim and is pressed by a flat spring attached to the second lever. Round, elliptical, and polygonal articles may be made by using two, three, or more levers and suitable profile tools.

10,490.—Method of Moulding Bricks: *H. Alexander.*—The plastic material is pressed forwards from the bottom of the pan into an ordinary cylinder machine by a pug mill, the opening in the mixing-pan being regulated with slides having slotted bolt holes, whilst all surplus clay in the mill will rise through ports in the mouthpiece and casing and drop over the edge into the mixing-pan.

## MEETINGS.

**Thursday, Friday, and Saturday, October 3, 4, and 5.**

*Royal Institute of British Architects.* — Visit to Glasgow and Annual Dinner. The programme as at present arranged is as follows:—Thursday, October 3 Annual Dinner. Friday, October 4: (1) Lunch in the Exhibition grounds, given by the Glasgow Institute to the Royal Institute visitors. (2) Visit to the Glasgow University (tea). (3) Conversazione given in honour of the Royal Institute by the Corporation of Glasgow. Saturday, October 5: Visits to Exhibition, &c.

**Friday, October 4.**

*Sanitary Institute* (*Lectures for Sanitary Officers*).—Mr. J. Wright Clarke on "Details of Plumbers' Work. 7 p.m.

**Saturday, October 5.**

*British Institute of Certified Carpenters.*—Monthly meeting. Mr. W. T. Sweett on "Modern Joinery." 6 p.m.

*Northern Architectural Association.*—Visit to Newcastle Breweries Premises and Electric Power Station, Newcastle.

*Sanitary Institute.*—Inspection and Demonstration at Sewage and Destructor Works, Ealing. 2.15 p.m.

**Monday, October 7.**

*Society of Engineers.*—"Preliminary Investigations for Water Supply," by Mr. Sydney M. Hollis; "Irrigation Works in South Africa," by Mr. J. Freebairn Slow. 7.30 p.m.

*Liverpool Architectural Society.*—President's opening address. 6 p.m.

**Tuesday, October 8.**

*Architectural Association of Ireland.*—Annual General Meeting, 20, Lincoln-place, Dublin. 7.45 p.m.

**Friday, October 11.**

*Architectural Association.*—Annual meeting: President's Address and delivery of prizes. 7.30 p.m.

## SOME RECENT SALES OF PROPERTY:

### ESTATE EXCHANGE REPORT.

September 18.—By Woods & Snelling (at Eltham).

| | |
|---|---|
| Eltham, Kent.—44 to 58 (even), High-st., f., r. 218*l.* | £3,695 |

By Worsfold & Hayward (at Sandwich).

| | |
|---|---|
| Barnsole, Kent.—A freehold farm, 170 a. 0 r. 30 p. | 830 |
| A freehold cottage and 0 a. 2 r. 2 p. | 250 |
| Market garden land, 4 a. 2 r. 25 p., f. | 280 |
| Preston, Kent.—Perry Farm, 22 a. 1 r. 37 p., f. | 800 |
| West Marsh, Kent.—House, cottage, and fruit plantation, 3 a. 3 r. 4 p., f. | 470 |
| Two freehold cottages and 4 a. 1 r. 29 p. | 195 |

September 19.—By Wm. Weston (at Uxbridge).

| | |
|---|---|
| Hillingdon Heath, Middlesex. — Uxbridge-rd., South Lodge and 1 a., e.r. 75*l.* | 1,100 |

By Payne, Trapps, & Co. (at Stratford).

| | |
|---|---|
| Whitstable, Kent.—Seeshill-rd., 11 plots of building land, f. | 107 |
| Southend-on-Sea, Essex.—7, Sea View-rd., f. | 450 |

September 20.—By Hussey & Son (at Exeter).

| | |
|---|---|
| Black Torrington, &c., Devon. — Butterbeare Farm, 287 a. 2 r. 34 p., f. | 2,500 |
| House, shop, and 1 a. 3 r. 22 p., f. | 520 |
| Hill Moor, &c., enclosures, 175 a. 3 r. 22 p., f. | 1,355 |
| Highweek Farm, 199 a. 2 r. 22 p., f. | 4,155 |
| Lana and Forda Farm, 409 a. 2 r. 31 p., f. | 3,200 |
| King's Moor, &c., meadows, 107 a. 2 r. 31 p., f. | 650 |
| East Graddon Farm, 395 a. 1 r. 7 p., f. | 1,620 |
| Moiety of Northcote Farm, 147 a. 1 r. 25 p., f. | 505 |
| Chilla Farm, 219 a. 3 r. 7 p., f. | 1,430 |
| Flares Farm, 118 a. 0 r. 29 p., f. | 1,100 |
| Nine freehold cottages and a site | 496 |
| Manor of Black Torrington, with high and chief rents | 152 |

By H. F. Russell & Son (at Leominster).

| | |
|---|---|
| Pembridge, &c., Hereford. — Lower Barewood Farm, 103 a. 2 r. 14 p., f. | 3,000 |
| The Barewood Farm, 15 a. 3 r. 27 p., f. | 720 |
| Two freehold cottages and 2 a. 0 r. 13 p. | 265 |
| Blacksmith's shop and 0 a. 3 r. 24 p., f. | 125 |
| Newtown, Hereford.—Two residences and 14 a. 2 r. 8 p., f. | 1,460 |
| Monkland, Hereford.—Two freehold cottages and gardens | 115 |

September 21.—By W. J. Villar & Co. (at Taunton).

| | |
|---|---|
| Otterford, Somerset.—The Wydecombe Estate, 142 a. 1 r. 25 p., f. | 3,500 |

By Peirce & Thorpe (at Northampton).

| | |
|---|---|
| Murcott, Northants.—A freehold farm, 35 a. 0 r. 33 p. | £1,700 |
| Long Buckby, Northants.—Surney Meadows, 16 a. 1 r. 18 p., f. | 720 |

September 24.—By David Burnett & Co.

| | |
|---|---|
| Bromley, Kent.—Blyth-rd., Summerland, f. | 1,595 |
| Southend, Essex.—69 and 71, London-rd., f., r. 72*l.* | 1,040 |

By Chetwynd, Lloyd, & Deane.

| | |
|---|---|
| Finsbury Park.—301, Green-lanes, u.t. 40½ yrs., g.r. 12*l.* 12s., e.r. 75*l.* | 620 |

By Flood & Sons.

| | |
|---|---|
| Edmonton.—Bury-st., The Brook House Building Estate, area 12 a.; also 1 to 16, Bury-st. and f.g.r. 22*l.* 10s., reversion in 98 yrs. | 7,600 |
| Croydon.—153 and 155, St. James's-rd., f., r. 75*l.* | 1,110 |
| Norwood.—Beulah Spa-ter., f.g.r. 40*l.*, reversion in 99 yrs. | 970 |

By Freehold Land and Trading Company.

| | |
|---|---|
| Twickenham.—8, Whitton Park-ter., f., e.r. 35*l.* | 540 |

By Fredk. Warman.

| | |
|---|---|
| Holloway.—21 and 23, Sussex-rd., u.t. 51 yrs., g.r. 10*l.* 10s., r. 70*l.* | 695 |
| 13, Alexander-rd., u.t. 56¼ yrs., g.r. 6*l.*, r. 36*l.* | 350 |
| Highgate.—66, Langdon-rd., u.t. 96 yrs., g.r. 8*l.* | 400 |
| Gray's Inn-rd.—9, Calthorpe-st., u.t. 18 yrs., g.r. 10*l.*, e.r. 75*l.* | 400 |
| 11, Wells-st., r. 55*l.*; also i.g.r. 5*l.*, u.t. 41 yrs., g.r. 10*l.* | 345 |
| Clerkenwell.—36, Amwell-st., u.t. 11 yrs., g.r. 7*l.*, e.r. 55*l.* | 265 |
| Carshalton, Surrey.—39, Mill-lane, f., r. 26*l.* | 350 |
| Canonbury.—4 and 6, Grange-rd., u.t. 35 yrs., g.r. 13*l.*, e.r. 130*l.* | 1,060 |
| Finsbury Park.—16 and 36, Wilberforce-rd., u.t. 65 yrs., g.r. 16*l.*, r. 96*l.* | 1,005 |
| Manor Park.—72, 74, and 76, Second-avenue, u.t. 90½ yrs., g.r. 15*l.*, e.r. 75*l.* | 650 |

By R. Donkin & Son (at Newcastle).

| | |
|---|---|
| Mitford, Northumberland.—The Edington Estate, 647 a., f. | 21,020 |

By J. Kittow (at Launceston).

| | |
|---|---|
| Otterham, Cornwall.—The Otterham Manor Estate, 900 a., f. | 5,000 |

September 24 and 25.—By Walter Ludlow & Briscoe (at Wolverhampton).

| | |
|---|---|
| Wolverhampton, Staffs.—The Lloyd House Estate, area about 796 a., f. (in numerous lots) | 54,802 |

September 25.—By Fuller, Horsey, Sons, & Cassell.

| | |
|---|---|
| Llanidloes, Montgomery.—The Van Lead Mines, 207 a. 3 r. 3 p., u.t. 12 yrs., subject to certain royalties and rentals; also a residence and 18 cottages, u.t. 35 and 33 yrs., g.r. 14*l.* (the whole as a going concern) | 3,000 |

By Baxter, Payne, & Lepper.

| | |
|---|---|
| Lambeth.—172, 174, and 176, Vauxhall-st., c., r. 81*l.* 18s. | 650 |

By Dyer, Son, & Hilton.

| | |
|---|---|
| Blackheath.—57, Kidbrook Park-rd., u.t. 63½ yrs., g.r. 10*l.*, e.r. 70*l.* | 600 |
| Lee.—Stone Yard-place, i.g.r. 12*l.* 12s., u.t. 63 yrs., g.r. 1*l.* 2s. | 235 |

By Douglas Young & Co.

| | |
|---|---|
| Wimbledon.—Pelham-rd., Dale House, f., e.r. 75*l.* | 1,000 |
| Clapham. — Rodenhurst-rd., Woodlands Lodge, area ¾ of an acre, f. | 790 |

By Joseph Stower (at Chesham).

| | |
|---|---|
| Chesham, Bucks.—Codmore Farm, 102 a. 0 r. 29 p., f. and c. | 4,000 |

By Cooper & Hill (at Hannington).

| | |
|---|---|
| Romsley, Worcester.—Romsley House Farm and The Halt, 123 a. 1 r. 10 p., f. | 2,550 |

September 26.—By Messrs. Cronk.

| | |
|---|---|
| Sevenoaks, Kent. — Vine Court-rd., a plot of building land, area ¾ of an acre, f. | 700 |

By J. G. Dean & Co.

| | |
|---|---|
| Wandsworth.—7, Althorpe-rd., f., e.r. 45*l.* | 550 |
| 3, Bolingbroke-grove, u.t. 80 yrs., g.r. 15*l.*, e.r. 80*l.* | 795 |

By Reynolds & Eason.

| | |
|---|---|
| Anerley.—40, 42, and 44, Anerley-vale, u.t. 50 yrs., g.r. 4*l.*, r. 59*l.* | 375 |
| City of London.—6, Cheapside, corner building site, let on building lease for eighty years at per annum | 530 |

By Linnett & Lane.

| | |
|---|---|
| Ealing.—2, Darwin-rd. and three plots of land adjoining, f. | 500 |

By C. C. & T. Moore.

| | |
|---|---|
| Forest Gate.—113, Earlham-grove, f., e.r. 70*l.* | 1,000 |
| Clapton.—114, Brooke-rd., u.t. 76 yrs., g.r. 8*l.*, e.r. 60*l.* | 750 |
| Manor Park.—119, White Post-lane, u.t. 70½ yrs., g.r. 4*l.* 10s., e.r. 40*l.* | 285 |
| Mile End.—14, St. Ann's-rd., f. | 355 |
| Haggerston.—14, Nicoll-st., f. | 410 |
| Bethnal Green.—3 and 4, Derby-pl., u.t. 52½ yrs., g.r. 4*l.* | 490 |

September 26.—By Stimson & Sons.

| | |
|---|---|
| Putney.—4, 6, 12 to 36 (even), Danemere-st., u.t. 97 yrs., g.r. 78*l.* 15s. | 3,650 |
| Leytonstone.—46, 48 and 50, Harrow-rd., f., r. 88*l.* | 1,405 |
| Bow.—81, 83 and 85, Antill-rd., u.t. 67 yrs., g.r. 13*l.* 10s., r. 90*l.* | 1,000 |
| 2, 4, 6 and 8, Balmer-rd., u.t. 72 yrs., g.r. 16*l.* | 920 |
| Brixton.—49, Holland-rd., u.t. 21 yrs., g.r. 7*l.* 7s., e.r. 42*l.* | 210 |
| Camberwell.—12, Boyson-rd., u.t. 51 yrs., g.r. 3*l.*, e.r. 40*l.* | 410 |

By Curtis & Sharp (at Stratford).

| | |
|---|---|
| Upton Manor.—16, 18 and 20, Lawrence-rd., f. | 1,190 |
| Canning Town.—Victoria Dock-rd., a corner block of building land, f. | 450 |

September 27.—By J. C. Platt.

| | |
|---|---|
| Lampton, Middlesex.—Lampton-rd., The Elms residential building estate, 25 acres, f. | 9,700 |
| Hove, Sussex.—59, Godstone Villas, f., e.r. 45*l.* | 550 |

***Contractions used in these lists.***—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard.

## PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

### BRICKS, &c.

| | £ s. d. | | |
|---|---|---|---|
| Hard Stocks | 1 14 0 | per 1,000 | alongside, in river. |
| Rough Stocks and Grizzles | 1 11 0 | ,, | ,, ,, |
| Facing Stocks | 2 12 0 | ,, | ,, ,, |
| Shippers | 2 8 0 | ,, | ,, ,, |
| Flettons | 1 8 6 | ,, | at railway depôt. |
| Red Wire Cuts | 1 14 6 | ,, | ,, ,, |
| Best Fareham Red | 3 11 0 | ,, | ,, ,, |
| Best Red pressed Ruabon Facing. | 5 5 0 | ,, | ,, ,, |
| Best Blue Pressed Staffordshire | 4 4 6 | ,, | ,, ,, |
| Do., Bullnose | 4 9 0 | ,, | ,, ,, |
| Best Stourbridge Fire Bricks | 4 2 6 | ,, | ,, ,, |
| Glazed Bricks | | | |
| Best White and Ivory Glazed Stretchers | 13 0 0 | ,, | ,, ,, |
| Headers | 12 0 0 | ,, | ,, ,, |
| Quoins, Bullnose, and Flats | 17 0 0 | ,, | ,, ,, |
| Double Stretchers | 19 0 0 | ,, | ,, ,, |
| Double Headers | 16 0 0 | ,, | ,, ,, |
| One Side and two Ends | 19 0 0 | ,, | ,, ,, |
| Two Sides and one End | 20 0 0 | ,, | ,, ,, |
| Splays, Chamfered, Squints | 20 0 0 | ,, | ,, ,, |
| Best Dipped Salt Glazed Stretchers and Headers | 12 0 0 | ,, | ,, ,, |
| Quoins, Bullnose, and Flats | 14 0 0 | ,, | ,, ,, |
| Double Stretchers | 15 0 0 | ,, | ,, ,, |
| Double Headers | 14 0 0 | ,, | ,, ,, |
| One Side and two Ends | 15 0 0 | ,, | ,, ,, |
| Two Sides and one End | 15 0 0 | ,, | ,, ,, |
| Splays, Chamfered, Squints | 14 0 0 | ,, | ,, ,, |
| Seconds Quality White and Dipped Salt Glazed | 2 0 0 | ,, | less than best. |

| | s. d. | | |
|---|---|---|---|
| Thames and Pit Sand | 7 3 | per yard, delivered. | |
| Thames Ballast | 6 0 | ,, | ,, |
| Best Portland Cement | 34 6 | per ton, delivered. | |
| Best Ground Blue Lias Lime | 25 6 | ,, | ,, |

Note.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime ..... 12s 6d. per yard, delivered.
Stourbridge Fire-clay in sacks, 28s. od. per ton at rly. dpt.

### STONE.

| | s. d. | | |
|---|---|---|---|
| Ancaster in blocks | 2 0 | per ft. cube, deld. rly. depôt. | |
| Bath ,, | 1 7 | ,, | ,, |
| Farleigh Down Bath | 1 8 | ,, | ,, |
| Beer in blocks | 1 6½ | ,, | ,, |
| Grinshill ,, | 1 10 | ,, | ,, |
| Brown Portland in blocks | 2 2 | ,, | ,, |
| Darley Dale in blocks | 2 1½ | ,, | ,, |
| Red Corsehill ,, | 2 5 | ,, | ,, |
| Red Mansfield ,, | 2 4½ | ,, | ,, |
| Hard York in blocks | 2 10 | ,, | ,, |
| Hard York 6 in. sawn both sides landings, to sizes (under 40 ft. sup.) | 2 8 | per ft. super at rly. depôt | |
| ,, ,, 6 in. Rubbed Ditto | 3 0 | ,, | ,, |
| ,, ,, 3 in. sawn both sides slabs (random sizes) | 1 3 | ,, | ,, |
| ,, ,, 2 in. self-faced Ditto | 0 9½ | ,, | ,, |
| Hopton Wood (Hard Bed) in blocks | 2 3 | per ft. cube. deld. rly. depôt | |
| ,, ,, ,, 6-in sawn both sides landings | 2 7 | per ft. super. deld. rly. depôt. | |
| ,, ,, ,, 3-in. do. | 1 2½ | ,, | ,, |

### SLATES.

| in. in. | £ s. d. | | |
|---|---|---|---|
| 20×10 best blue Bangor | 11 5 0 | per 1000 of 1200 at ry. dep. | |
| ,, best seconds ,, | 10 15 0 | ,, | ,, |
| 16× 8 best ,, | 6 2 6 | ,, | ,, |
| 20×10 best blue Portmadoc | 10 18 0 | ,, | ,, |
| 16× 8 best blue Portmadoc | 6 0 0 | ,, | ,, |
| 20×10 best Eureka unfading green | 11 2 6 | ,, | ,, |
| 16× 8 ,, ,, | 6 15 0 | ,, | ,, |
| 20×10 Permanent green | 10 0 0 | ,, | ,, |
| 16× 8 ,, ,, | 5 12 6 | ,, | ,, |

### TILES.

| | s. d. | | |
|---|---|---|---|
| Best plain red roofing tiles | 41 6 | per 1,000 at rly. depôt | |
| Hip and valley tiles | 3 7 | per doz. | |
| Best Broseley tiles | 48 6 | per 1,000 | ,, ,, |
| Hip and valley tiles | 4 0 | per doz. | ,, ,, |
| Best Ruabon Red, brown or brindled Do. (Edwards) | 57 6 | per 1,000 | ,, ,, |
| Do. ornamental Do. | 60 0 | ,, | ,, ,, |
| Hip tiles | 4 0 | per doz. | ,, ,, |
| Valley tiles | 3 9 | ,, | ,, ,, |
| Best Red or Mottled Staffordshire Do. (Peakes) | 50 9 | per 1,000 | ,, ,, |
| Hip tiles | 4 1 | per doz. | ,, ,, |
| Valley tiles | 3 8 | ,, | ,, ,, |

### WOOD.

Building Wood.—Yellow.

| | At per standard. £ s. d. | £ s. d. |
|---|---|---|
| Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in. | 14 10 0 | 16 10 0 |
| Deals: best 3 by 9 | 13 10 0 | 14 10 0 |
| Battens: best 2½ in. by 7 in. and 8 in. and 3 in. by 7 in. and 8 in. | 11 0 0 | 12 0 0 |

[See also page 303.

# COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

*(For some Contracts, &c., still open, but not included in this List, see previous issues.)*

## COMPETITIONS.

| Nature of Work. | By whom Advertised. | Premiums. | Designs to be delivered |
|---|---|---|---|
| *Isolation Hospital | Bexhill U.D.C. | 25*l* | Nov. 23 |

## CONTRACTS.

| Nature of Work or Materials. | By whom Required. | Forms of Tender, &c., Supplied by | Tenders to be delivered |
|---|---|---|---|
| Schools, Oxford-street (Contract No. 1) | Bridlington School Board | J. Earnshaw, Architect, Bridlington | Oct. 8 |
| Heating, &c., Schools | do. | do. | do. |
| Public Baths, &c., Duke-street Park | Sheffield Corporation | C. F. Wike, Civil Engineer, Town Hall, Sheffield | do. |
| *Roadmaking and Paving Works | Willesden District Council | O. Claude Robson, Dyne-road, Kilburn, N.W. | do. |
| Additions to Workhouse Infirmary, &c. | Stone (Staffs) Guardians | J. J. Chapman, Architect, Stone | do. |
| Seven Houses, Melbourne-road, Carlisle | ..... | J. Beaty, Old Post Office Court, Carlisle | do. |
| Police Court, Abertillery, Mon. | Standing Joint Committee | W. Tanner, County Surveyor, Abertillery | do. |
| Heating Work, Central Schools | Bridlington (U.D.) School Board | J. Earnshaw, Architect, Bridlington | do. |
| *Reconstruction of Combined Drainage | Metropolitan Borough of Fulham | Medical Officer of Health, Town Hall, Fulham | do. |
| *Making-up Streets | Enfield U.D.C. | Surveyor to Council, Court House, Enfield | Oct. 9 |
| Kiln, Chimney, &c., Summer-lane, Barnsley | ..... | G. H. Gray, 6, Royal-street, Barnsley | do. |
| Villa, Deramore Drive, Belfast | ..... | Blackwood & Jury, Architects, 41, Donegall-place, Belfast | do. |
| Road Works, Clyde-street, &c., Old Hill | Rowley Regis U.D.C. | D. Wright, Old Hill, Staffs | do. |
| School, Rowland's Gill | Winlaton School Board | Liddle & Brown, Architects, Mosley-street, Newcastle-on-Tyne | Oct. 10 |
| Sewers, Regent-road | Salford Corporation | Borough Engineer, Town Hall, Salford | do. |
| Stabling, Stone Trough Brewery, Halifax | Messrs. T. Ramsden & Son, Ltd. | W. H. D. Horsfall, Architect, Tower Chambers, Halifax | do. |
| Electric Lighting, Halfway-street, Sidcup | Greenwich Guardians | T. Dinwiddy, Architect, 12, Crooms-hill, Greenwich | do. |
| Forty Shops, Ipswich | ..... | Eade & Johns, Architects, Cornhill Chambers, Ipswich | do. |
| Five Cottages, Margam, Wales | Miss E. C. Talbot | G. Lipscomb, Estate Office, Margam Park, Port Talbot | do. |
| Concrete Work at Electricity Station | Dundee Gas Commissioners | W. Alexander, Architect, Dundee | do. |
| Additions to Workhouse, Orclid, Cheshire | Congleton Guardians | A. Price, Architect, Elworth | do. |
| Water Supply Works, Welburn | Malton (Yorks) R.D.C. | R. Richardson, Civil Engineer, Town Hall, Malton | Oct. 11 |
| Drainage Works, &c., Welburn | do. | do. | do. |
| *Limestone Tar Paving | Broadstairs & St. Peter's U.D.C. | Town Surveyor, Council Offices, Broadstairs | Oct. 12 |
| Water Supply Works | Aspatria (Cumberland) T.C. | Pickering & Crompton, C.E., 11, Lowther-street, Whitehaven | do. |
| Borehole, East Donyland | Lexden & Winstree R.D.C. | Sands & Walker, Architects, Angel-row, Nottingham | do. |
| Sewerage Works, Dovenby | Cockermouth R.D.C. | J. B. Wilson, Civil Engineer, Cockermouth | do. |
| Widening Road, Grange Village | do. | do. | do. |
| *Erection of School | Farningham School Board | G. H. Tait, Architect, Dartford, Kent | do. |
| Waterworks, Aspatria, Cumberland | ..... | Pickering & Crompton, C.E., 11, Lowther-street, Whitehaven | do. |
| Additions to Infirmary | Berkhampstead Guardians | C. H. Rew, Architect, Berkhampstead | do. |
| *Firemen's Cottages, &c. | Beckenham U.D.C. | J. A. Angell, Surveyor, Beckenham | Oct. 14 |
| Additions to Schools, Hanover-street, Batley | ..... | C. H. Marriott, Son, & Shaw, Architects, Dewsbury | do. |
| Additions to Hospital, Taunton | Taunton & Somerset Hosp. Comte. | J. H. Spencer, Architect, 5, Hammel-street, Taunton | do. |
| *Making-up Roads | Beckenham U.D.C. | John A. Angell, Surveyor, Beckenham | do. |
| Sewers, Old Hollington-lane | Hastings Corporation | P. H. Palmer, Civil Engineer, Town Hall, Hastings | do. |
| Steel Rails (2,200 tons) | Great Northern Ry. Co. (Ireland) | T. Morrison, Amiens-street Terminus, Dublin | do. |
| Cement, Pipes, &c. | Belfast Harbour Commissioners | G. F. L. Giles, Engineer, Harbour Offices, Belfast | do. |
| *Builders' Work for New Baths | Bristol Corporation | W. S. Skinner, Architect, 16, Baldwin-street, Bristol | Oct. 15 |
| Motor Cars | Leeds Corporation | T. Hewson, Civil Engineer, Municipal Buildings, Leeds | do. |
| Additions to Workhouse, Renfrew-road | Lambeth Guardians | S. R. J. Smith, Architect, 14, York-buildings, Adelphi | do. |
| Water Supply Works | Buckfastleigh (Devon) U.D.C. | T. W. Stainthorpe, Civil Engineer, Totnes, Devon | do. |
| Laying Cast-iron Pipes (4½ miles), Todmorden | Rochdale Corporation | J. Mansergh, Engineer, 5, Victoria-street, S.W. | do. |
| Gas Works, Upton, Lea | Slough Gas Co. | T. Webb, Engineer, Gas Works, Slough | do. |
| *Roadmaking Works | Hornsey U.D.C. | Engineer to Council, Southwood-lane, Highgate | do. |
| *Parochial Hall, Trinity Church, Finchley-road | The Church Committee | J. B. Lofting, 37, Old Queen-street, Westminster | do. |
| Baths, Maze-street, Barton Hill | Bristol Corporation | W. S. Skinner, Architect, 16, Baldwin-street, Bristol | do. |
| Chapel at Asylum, Sligo | Asylum Committee | Sir T. N. Deane & Son, Architects, 15, Ely-place, Dublin | do. |
| *Victoria Stone Paving | Tottenham U.D.C. | W. H. Prescott, 712, High-road, Tottenham | do. |
| School, Chipping Hill | Witham (Essex) School Board | W. P. Perkins, Surveyor, Council Offices, Witham | Oct. 16 |
| *Low-level Sewer | Wimbledon U.D.C. | Engineer, Council Offices, Wimbledon | do. |
| *Shalfleet Water Supply Works | Isle of Wight R.D.C. | S. E. Tompkins, Engineer, Newport, Isle of Wight | do. |
| *Newchurch Water Supply Works | do. | Clerk to Council, Pyle-street, Newport, Isle of Wight | do. |
| Police and Fire Station, Mill-street | Manchester Corporation | City Surveyor, Town Hall, Manchester | do. |
| *Granite Kerb and Setts, Paving Slabs, &c. | Ware U.D.C. | J. E. Smales, Surveyor, New-road, Ware | Oct. 17 |
| *Barging Away and Disposal of Rubbish | Metropolitan Borough of Stepney | Borough Engineer, 15, Great Alie-street, Whitechapel, E. | Oct. 19 |
| *Sub-District Post Office, West Kensington | Commissioners of H.M. Works | H. Tanner, H.M. Office of Works | Oct. 20 |
| *Heating and Ventilating Youghal Lunatic Asylum | Cork District Lunatic Asylum | H. A. Cutler, Municipal Buildings, Cork | Oct. 21 |
| *Artizans' Dwellings, Plaistow | West Ham Council | Borough Engineer, Town Hall, West Ham, E | Oct. 22 |
| *Additions to Hospital | Willesden District Council | O. Claude Robson, Engineer, Dyne-road, Kilburn | do. |
| *Additional Wing to Asylum | Cambridgeshire, &c., Asylum | A. P. MacAlister, Architect, 20, St. Andrew's-street, Cambridge | Oct. 24 |
| *Drainage Works | Gosport and Alverstoke U.D.C. | R. St. George Moore, Civil Engineer, 17, Victoria-street, S.W. | Oct. 28 |
| *Furniture for New School | East Ham School Board | R. L. Curtis, 120, London-wall, E.C. | do. |
| *Workshops and Outbuildings | Hackney Institute | A. W. S. Cross, Architect, 58, Conduit-street, W. | do. |
| *Town Hall | Cheltenham Corporation | Town Clerk, Municipal Offices, Cheltenham | Oct. 30 |
| *Refuse Destructor Installation | Levenshulme U.D.C. | J. Jepson, Surveyor, Levenshulme | Nov. 2 |
| *Small School, Monmouth | Haberdashers' Co. | H. Stock, Architect, 9, Denman-street, S.E. | No date |
| *New Arcade, Ipswich | ..... | Eade & Johns, Architects, Ipswich | do. |
| *Kennels for Surrey Union Hunt | Lord Ashcombe | C. Smith & Son, Architects, Reading | do. |
| Two Houses, Bath-road, Worthing | ..... | R. S. Hyde, Architect, Worthing | do. |
| Drill Hall, Wrexham | ..... | M. J. Gummow, Architect, Egerton-street, Wrexham | do. |
| Church, Chorlton-cum-Hardy, near Manchester | The Primitive Methodists | Moulds & Perritt, Architects, 77, King-street, Manchester | do. |
| Sewers (6 miles), Felixstowe | ..... | W. Durrant, Rocksdale, Felixstowe | do. |

## PUBLIC APPOINTMENTS.

| Nature of Appointment. | By whom Advertised. | Salary. | Application to be in |
|---|---|---|---|
| *Temporary Assistants (2), Borough Engineer's Dept. | Borough of Islington | Not stated | Oct. 10 |
| *Inspector for Sewerage | South Stoneham R.D.C. | 3*l.* 3*s.* per week | do. |
| Surveyor and Engineer | Bilston U.D.C. | 200*l.* | Oct. 19 |

*Those marked with an asterisk (*) are advertised in this Number.* *Competitions, p.* iv. *Contracts, pp.* iv. vi. viii. x. & xxii. *Public Appointments, pp.* xix. & xxii.

## PRICES CURRENT (*Continued*).

### WOOD.

| | At per standard. £ s. d. | £ s. d. |
|---|---|---|
| Battens: best 2½ by 6 and 3 by 6 .. | 0 10 0 | less than 7 in. and 8 in. |
| Deals: seconds ..... | 1 0 0 | less than best |
| Battens: seconds ..... | 0 10 0 | ,, ,, ,, |
| 2 in. by 4 in. and 2 in. by 6 in. .. | 9 0 0 | 10 10 0 |
| 2 in. by 4½ in. and 2 in. by 5 in. | 9 0 0 | 10 0 0 |
| Foreign Sawn Boards— | | |
| 1 in. by 1½ in. by 1½ in. ..... | 0 10 0 | more than battens. |
| ¾ in. ..... | 1 0 0 | ,, |
| Fir timber: Best middling Danzig or Memel (average specification) ..... | At per load of 50 ft. 4 10 0 | 5 0 0 |
| Seconds ..... | 4 5 0 | 4 10 0 |
| Small timber (8 in. to 10 in.) .... | 3 12 6 | 3 15 0 |
| Swedish balks..... | 2 15 0 | 3 0 0 |
| Pitch pine timber (35 ft. average).. | 3 0 0 | 3 10 0 |
| JOINERS' WOOD. | At per standard. | |
| White Sea: First yellow deals, 3 in. by 11 in..... | 25 0 0 | 26 0 0 |
| 3 in. by 9 in. ..... | 22 0 0 | 23 0 0 |
| Battens, 2½ in. and 3 in. by 7 in. | 18 0 0 | 20 0 0 |
| Second yellow deals, 3 in. by 11 in. | 20 0 0 | 21 0 0 |
| ,, ,, 3 in. by 9 in. | 18 0 0 | 19 0 0 |
| Battens, 2½ in. and 3 in. by 7 in. | 14 0 0 | 15 0 0 |
| Third yellow deals, 3 in. by 11 in. and 9 in. ..... | 14 10 0 | 15 10 0 |
| Battens, 2½ in. and 3 in. by 7 in. | 12 0 0 | 12 10 0 |
| Petersburg: first yellow deals, 3 in. by 11 in. ..... | 22 0 0 | 23 0 0 |
| Do. 3 in. by 9 in. ..... | 19 0 0 | 20 0 0 |
| Battens..... | 14 0 0 | 15 0 0 |
| Second yellow deals, 3 in. by 11 in..... | 15 10 0 | 16 10 0 |
| Do. 3 in. by 9 in. ..... | 14 0 0 | 15 0 0 |
| Battens..... | 11 10 0 | 12 0 0 |
| Third yellow deals, 3 in. by 11 in..... | 13 10 0 | 14 10 0 |
| Do. 3 in. by 9 in. ..... | 13 0 0 | 13 10 0 |
| Battens..... | 10 10 0 | 11 10 0 |
| White Sea and Petersburg:— | | |
| First white deals, 3 in. by 11 in.. | 15 0 0 | 16 0 0 |
| ,, ,, ,, 3 in. by 9 in... | 14 0 0 | 15 0 0 |
| Battens..... | 12 0 0 | 13 0 0 |
| Second white deals 3 in. by 11 in. | 14 0 0 | 15 0 0 |
| ,, ,, ,, 3 in. by 9 in. | 13 0 0 | 14 0 0 |
| ,, ,, battens ..... | 10 10 0 | 11 10 0 |
| Pitch pine: deals ..... | 16 0 0 | 18 0 0 |
| Under 2 in. thick extra ..... | 0 10 0 | 1 0 0 |
| Yellow Pine— | | |
| First, regular sizes ..... | 30 0 0 | 33 0 0 |
| Broads (12 in. and up) ..... | 2 0 0 | more. |
| Oddments ..... | 22 0 0 | 24 0 0 |
| Seconds, regular sizes ..... | 24 10 0 | 26 10 0 |
| Yellow Pine Oddments ..... | 20 0 0 | 22 0 0 |
| Kauri Pine—Planks, per ft. cube.. | 0 3 6 | 0 4 6 |
| Danzig and Stettin Oak Logs— | | |
| Large, per ft. cube ..... | 0 2 6 | 0 3 0 |
| Small ,, ,, ..... | 0 2 3 | 0 2 6 |
| Wainscot Oak Logs, per ft. cube .. | 0 5 0 | 0 5 6 |
| Dry Wainscot Oak, per ft. sup. as inch ..... | 0 0 8 | 0 0 7 |
| in. do. do. ..... | 0 0 7 | - - - |
| Dry Mahogany— | | |
| Honduras, Tabasco, per ft. sup. as inch ..... | 0 0 9 | 0 0 11 |
| Selected, Figury, per ft. sup. as inch ..... | 0 1 6 | 0 2 0 |
| Dry Walnut, American, per ft. sup. as inch..... | 0 0 10 | 0 1 0 |
| Teak, per load ..... | 16 0 0 | 20 0 0 |
| American Whitewood Planks— | | |
| Per ft. cube..... | 0 3 0 | 0 3 6 |
| Prepared Flooring— | Per square | |
| 1 in. by 7 in. yellow, planed and shot ..... | 0 13 6 | 0 16 6 |
| 1 in. by 7 in. yellow, planed and matched..... | 0 13 6 | 0 17 6 |
| 1¼ in. by 7 in. yellow, planed and matched ..... | 0 16 0 | 1 1 0 |
| 6 in. at 6d. per square less than 7 in. | | |
| 1 in. by 7 in. white, planed and shot ..... | 0 11 0 | 0 13 0 |
| 1 in. by 7 in. white, planed and matched..... | 0 11 6 | 0 13 6 |
| 1¼ in. by 7 in. white, planed and matched ..... | 0 14 0 | 0 16 6 |
| 6 in. at 6d. per square less than 7 in. | | |

### JOISTS, GIRDERS, &c.

| | In London, or delivered to Railway Vans, per ton. £ s. d. | £ s. d. |
|---|---|---|
| Rolled Steel Joists, ordinary sections | 6 15 0 | 7 15 0 |
| Compound Girders ,, ,, | 8 15 0 | 10 0 0 |
| Angles, Tees and Channels, ordinary sections ..... | 8 12 6 | 10 12 6 |
| Flitch Plates ..... | 8 15 0 | 9 10 0 |
| Cast Iron Columns and Stanchions, including ordinary patterns ..... | 7 5 0 | 9 0 0 |

### METALS.

| | Per ton, in London. £ s. d. | £ s. d. |
|---|---|---|
| IRON.— | | |
| Common Bars..... | 8 0 0 | 8 10 0 |
| Staffordshire Crown Bars, good merchant quality ..... | 8 10 0 | 9 0 0 |
| Staffordshire "Marked Bars" .. | 10 10 0 | - - - |
| Mild Steel Bars..... | 9 0 0 | 9 10 0 |
| Hoop Iron, basis price..... | 9 5 0 | 9 15 0 |
| ,, ,, galvanised ..... | 16 0 0 | - - - |
| (* And upwards, according to size and gauge.) | | |
| Sheet Iron, Black.— | | |
| Ordinary sizes to 20 g. ..... | 10 0 0 | - - - |
| ,, ,, to 24 g. ..... | 11 0 0 | - - - |
| ,, ,, to 26 g. ..... | 12 10 0 | - - - |
| Sheet Iron, Galvanised, flat, ordinary quality.— | | |
| Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g..... | 12 10 0 | - - - |
| ,, ,, 22 g. and 24 g. | 13 0 0 | - - - |
| ,, ,, 26 g..... | 14 0 0 | - - - |
| Sheet Iron, galvanised, flat, best quality.— | | |
| Ordinary sizes to 20 g. ..... | 16 10 0 | - - - |
| ,, ,, 22 g. and 24 g. | 17 0 0 | - - - |
| ,, ,, 26 g..... | 18 10 0 | - - - |

## PRICES CURRENT (*Continued*).

### METALS.

| | Per ton, in London. £ s. d. | £ s. d. |
|---|---|---|
| IRON— | | |
| Galvanised Corrugated Sheets.— | | |
| Ordinary sizes, 6 ft. to 8 ft. 20 g. | 12 10 0 | - - - |
| ,, ,, 22 g. and 24 g. | 13 0 0 | - - - |
| ,, ,, 26 g. ..... | 14 0 0 | - - - |
| Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker .. | 12 5 0 | - - - |
| ,, ,, 22 g. and 24 g. | 13 5 0 | - - - |
| ,, ,, 26 g. ..... | 14 5 0 | - - - |
| Cut nails, 3 in. to 6 in..... | 9 10 0 | 10 0 0 |
| (Under 3 in. usual trade extras.) | | |
| LEAD, &c. | Per ton, in London. £ s. d. | £ s. d. |
| LEAD—Sheet, English, 3 lbs. & up. | 14 17 6 | - - - |
| Pipe in coils ..... | 15 7 6 | - - - |
| Soil Pipe.. ..... | 17 17 6 | - - - |
| ZINC—Sheet— | | |
| Vieille Montagne ..... ton | 24 10 0 | - - - |
| Silesian..... | 24 0 0 | - - - |
| COPPER— | | |
| Strong Sheet..... per lb. | 0 1 0½ | - - - |
| Thin ..... ,, | 0 1 2 | - - - |
| Copper nails ..... ,, | 0 1 2 | - - - |
| BRASS— | | |
| Strong Sheet..... ,, | 0 0 11 | - - - |
| Thin ,, ..... ,, | 0 1 1 | - - - |
| TIN—English Ingots ..... ,, | 0 1 4½ | - - - |
| SOLDER—Plumbers' ..... ,, | 0 0 7 | - - - |
| Tinmen's ..... ,, | 0 0 8 | - - - |
| Blowpipe ..... ,, | 0 0 9 | - - - |

### PLASTER, &c.

| | s. d. | |
|---|---|---|
| Coarse Plaster..... | 30 6 | per ton delivered. |
| Fine ,, ..... | 47 6 | ,, ,, |
| Superfine ,, ..... | 88 6 | ,, ,, |
| Coarse Keenes and Parian cement ..... | 55 0 | ,, ,, |
| Fine do. do. | 75 0 | ,, ,, |
| Robinson's Fireproof Cement.. | 50 0 | ,, ,, |
| Do. Fine white, finishing (Exclusive of the ordinary charge for sacks. | 55 0 | ,, ,, |
| Whiting..... 27 0 to | 30 0 | ,, ,, |
| Cow hair for plastering.....£9 | 0 0 | ,, ,, |

### ENGLISH SHEET GLASS IN CRATES.

| | | |
|---|---|---|
| 15 oz. thirds ..... | 3d. | per ft. delivered. |
| ,, ,, fourths ..... | 2¾d. | ,, ,, |
| 21 oz. thirds ..... | 3¾d. | ,, ,, |
| ,, ,, fourths..... | 3½d. | ,, ,, |
| 26 oz. thirds ..... | 5d. | ,, ,, |
| ,, ,, fourths ..... | 4½d. | ,, ,, |
| 32 oz. thirds ..... | 6d. | ,, ,, |
| ,, ,, fourths ..... | 5½d. | ,, ,, |
| Fluted sheet, 15 oz. ..... | 3½d. | ,, ,, |
| ,, ,, 21 ,, ..... | 4½d. | ,, ,, |
| ½ Hartley's Rolled Plate..... | 3d. | ,, ,, |
| ⅝ ,, ,, ,, ..... | 3½d. | ,, ,, |
| ½ ,, ,, ,, ..... | 4d. | ,, ,, |

### OILS, &c.

| | | £ s. d. |
|---|---|---|
| Raw Linseed Oil in pipes.....per gallon | | 0 2 10 |
| ,, ,, ,, in barrels ..... | ,, | 0 2 11 |
| ,, ,, ,, in drums ..... | ,, | 0 3 1 |
| Boiled ,, ,, in pipes..... | ,, | 0 3 0 |
| ,, ,, ,, in barrels ..... | ,, | 0 3 1 |
| ,, ,, ,, in drums ..... | ,, | 0 3 3 |
| Turpentine, in barrels ..... | ,, | 0 2 3 |
| ,, in drums..... | ,, | 0 2 5 |
| Genuine Ground English White Lead ...per ton | | 22 0 0 |
| Red Lead, Dry..... | ,, | 22 10 0 |
| Best Linseed Oil Putty.....per cwt. | | 0 9 0 |
| Stockholm Tar ..... per barrel | | 1 10 0 |

### VARNISHES, &c.

| | per gallon. £ s. d. |
|---|---|
| Fine Elastic Copal Varnish for outside work .. | 0 16 6 |
| Best Elastic Copal Varnish for outside work .. | 1 0 0 |
| Best Elastic Carriage Varnish for outside work | 0 16 0 |
| Best Hard Oak Varnish for inside work..... | 0 10 6 |
| Best Extra Hard Church Oak Varnish for inside work ..... | 0 10 6 |
| Fine Hard Copal Varnish for inside work ..... | 0 16 0 |
| Best Hard Copal Varnish for inside work ..... | 1 0 0 |
| Best Hard Carriage Varnish for inside work.... | 0 16 0 |
| Extra Pale Paper Varnish ..... | 0 12 0 |
| Best Japan Gold Size ..... | 0 10 6 |
| Best Black Japan ..... | 0 16 0 |
| Oak and Mahogany Stain ..... | 0 9 0 |
| Brunswick Black ..... | 0 8 6 |
| Berlin Black ..... | 0 16 0 |
| Knotting ..... | 0 10 0 |
| Best French and Brush Polish ..... | 0 10 0 |

## TO CORRESPONDENTS.

E. W.—T. S. (Amount should have been stated). J. W. (Below our limit).

NOTE.—The responsibility of signed articles, letters, and papers read at meetings, rests, of course, with the authors.

*We cannot undertake to return rejected communications.*

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article is given subject to the approval of the article, when written, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

## TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursdays.* N.B.—We cannot publish tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of tenders accepted unless the amount of the tender is given, nor any list in which the lowest tender is under £100, unless in some exceptional cases and for special reasons.]

* Denotes *accepted.* † Denotes *provisionally accepted.*

BARNSLEY.—Accepted for the erection of a lodge, additions to laundry, &c., Kendray Hospital, for the Town Council. Mr. J. H. Taylor, C.E., Manor House, Barnsley:—

*Section 1.*

| | | |
|---|---|---|
| *Brickwork.*—G. Mellor ..... | £336 0 | |
| *Carpentry, &c.*—J. Smith.... | 195 0 | |
| *Plastering.*—Miss Fleming ... | 54 10 | |
| *Slating.*—Miss Fleming ..... | 36 10 | |
| *Smith and Foundry work, and Plumbing and Glazing.*—J. Snowden ..... | 112 0 | |
| | | £734 0 |

*Section 2.*

| | | |
|---|---|---|
| *Brickwork.*—G. Mellor . .... | £1,012 0 | |
| *Carpentry, &c.*—A. Owram .. | 555 0 | |
| *Pastering.*—T. Lindley ..... | 178 5 | |
| *Slating.*—Miss Fleming ..... | 120 0 | |
| *Smith and Foundry work, and Plumbing and Glazing.*—B. Dennison ..... | 205 9 | |
| | | £2,070 14 |

*Section 3.*

| | | |
|---|---|---|
| *Brickwork, &c.*—G. Mellor .. | £881 0 | |
| *Carpentry, &c.*—A. Owram .. | 725 0 | |
| *Plastering.*—Miss Fleming .. | 177 0 | |
| *Slating.*—Miss Fleming ..... | 194 10 | |
| *Smith and Foundry work, and Plumbing and Glazing.*—B. Dennison ..... | 200 12 | |
| *Hotwater Engineering.* — J. Snowden ..... | 215 0 | |
| | | £2,393 2 |

*Section 4.*

| | | |
|---|---|---|
| *Brickwork, &c.*—G. Mellor .. | £159 0 | |
| *Carpentry, &c.*—A. Owram .. | 75 0 | |
| *Plastering.*—T. Lindley ..... | 10 8 | |
| *Slating.*—Miss Fleming..... | 38 0 | |
| *Plumbing and Glazing.*—B. Dennison ..... | 27 6 | |
| | | £309 14 |

*Section 5.*

| | | |
|---|---|---|
| *Brickwork.*—G. Mellor ..... | | 325 0 |
| | | £5,832 10 |

[All of Barnsley.]

BARNSLEY.—For the erection of a villa, Park-grove, for the United Methodist Free Church Trustees, Barnsley Circuit. Mr. C. L. McLintock, architect, 28, Church-street, Barnsley. Quantities by architect:—

| | |
|---|---|
| *Building.*—J. W. Hampson* ..... | £394 10 |
| *Carpentry and Joinery.*—Atkinson Bros.* | 110 10 |
| *Plumbing and Glazing.*—J. R. Sharp* .. | 75 0 |
| *Plastering.*—T. Lindley* ..... | 55 15 |
| *Slating.*—M. E. Fleming*..... | 27 0 |
| *Painting.*—Beaumont Bros.* ..... | 14 0 |

[All of Barnsley.]

BIRMINGHAM.—For the erection of two cottages, and additional farm buildings, &c., Marston Green, for the Guardians. Messrs. Whitwell & Sons, architects, 23, Temple-row, Birmingham:—

A. Colin Hughes, Stratford-rd., Birmingham*.. £1,495

[Architect's estimate .... £1,650.]

BRIGHTON.—For the erection of thirty artisans' dwellings, Dewe-road, &c., for the Town Council. Mr. F. J. C. May, C.E., Town Hall, Brighton:—

| | | | |
|---|---|---|---|
| Latten & Evershed.. | £6,990 | Mitchell & Co. ... | £6,075 |
| Turnbull & Co. .... | 6,577 | S. & W. Simmonds, Brighton* ..... | 5,950 |
| F. Clarke ..... | 6,412 | J. A. Mordecai .... | 5,700 |
| Norman, French, & Co. | 6,090 | | |

BRISTOL.—For alterations, &c., to Royal Infirmary. Mr. A. P. J. Cotterell, architect, 28, Baldwin-street, Bristol:—

| | | | |
|---|---|---|---|
| B. H. Howell ..... | £724 | Thomas & Son ..... | £596 |
| A. J. Bevan ..... | 680 | E. T. Hatherley..... | 574 |
| S. R. Gorvett ..... | 675 | A. Dowling, Montpelier, Bristol*..... | 553 |
| E. Love ..... | 629 | | |
| L. Browning ..... | 600 | | |

FLOOKBURGH (Lancs.).—For rebuilding farm premises, Field Head, for Miss Seatle. Mr. C. P. Chambers, architect, 34, Cornwallis-street, Barrow-in-Furness:—

| | | | |
|---|---|---|---|
| W. Blair ..... | £521 1 9 | R. Hutton, Cark-in-Cartmel .. | £458 7 6 |

KIRKBY-IN-ASHFIELD.—For the execution of sewerage works, Pinxton-road, Church Hill, and Skegby-road, for the Urban District Council. Mr. W. Dodsley, surveyor, 14, Stockwell-gate, Mansfield:—

| | | | |
|---|---|---|---|
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| Lock & Andrews..... | 1,389 13 0 | Tomlinson, South Normanton, Alfreton* .... | 967 0 0 |
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| W. & M. Halkes | 6,696 0 | Lincoln Co-operative Soc., Silver-street, Lincoln* | 6,050 19 |
| H. S. & W. Close | 6,680 0 | | |
| Halkes Bros. .... | 6,619 0 | | |

[*See also next page.*

LLANDAFF.—For widening a bridge over River Ely, St. Fagan's, for the Rural District Council. Mr. J. Holden, C.E., 35, St. Mary-street, Cardiff:—

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| Thos. Rees .... | 486 17 0 | J. Evans, Plas-newydd-place, Cardiff* .... | 344 2 0 |
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LLANFAIRFECHAN (Wales).—For the erection of business premises, &c., for Mr. W. Eames. Mr. R. Davies, architect, 125, High-street, Bangor:—

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| J. Jenkins ..... | 610 0 | | |
| S. H. Williams.... | 595 0 | | |

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| A. W. Robins ..... | 130 0 0 |
| Barrett & Power ..... | 140 0 0 |
| Ridgway & Son ..... | 210 0 0 |

*Partitions, Forest-road Schools.*

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|---|---|
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| Barrett & Power ..... | 117 0 0 |
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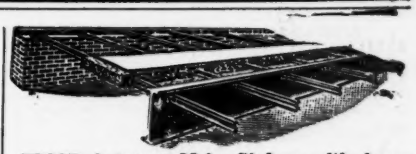

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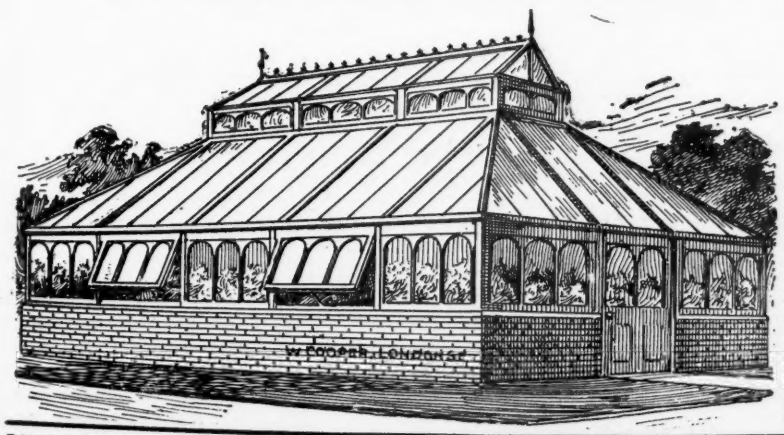

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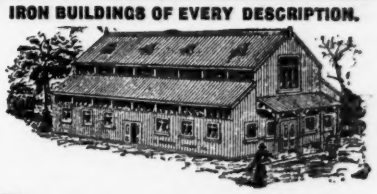

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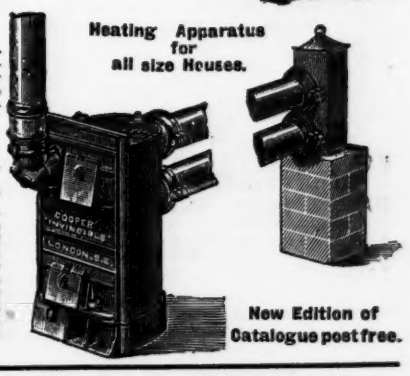

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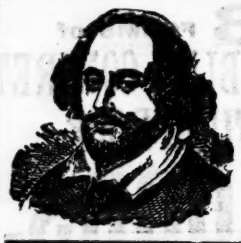

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**Lectures on Sanitary Building Construction.**
In connexion with an EXAMINATION to be held at CARPENTERS' HALL on NOVEMBER 15th and 17th, will be delivered as follows:—

| DATE, 1901. | LECTURER. | SUBJECT AND SYNOPSIS. |
|---|---|---|
| | | **Building in its Relation to Health.** |
| Thursdays, Oct. 10th | KEITH DOWNES YOUNG, Esq., F.R.I.B.A. | Soils. Foundations. The prevention of all that would prove detrimental to Health. Materials; Structure; Planning, &c. **Sanitary Architecture.** |
| Oct. 17th | MARK H. JUDGE, Esq., F.R.I.B.A. | Design; Materials; Buildings; Workmanship and Supervision. **Sanitary Appliances** |
| Oct. 24th | A. WYNTER BLYTH, Esq., Medical Officer of Health for St. Marylebone. | The Advantages and Disadvantages of various Sanitary Appliances used in Buildings. Principles of Ventilating and Warming Buildings. **The Supply, Distribution, and Use of Water in Buildings.** |
| Oct. 31st | PROF. T. ROGER SMITH, F.R.I.B.A. Professor of Architecture, University College, London. | Springs; Mains; Hydraulic Rams; Cisterns; Pipes; Taps; Hot Water Circulation; Baths, &c. **Setting Out Work and By-Laws.** |
| Nov. 7th | JAMES BARTLETT, Esq., M.S.A.,. Lecturer, King's College, London. | Principles of Calculating Areas, Cubic space; Interpretation of Drawings to Scale; Methods of Setting out Work, Checking Levels. Knowledge of the Acts of Parliament relating to Buildings. The Model By-Laws issued by the Local Government Board, so far as they relate to the subjects of the Examination. |

These Lectures are primarily intended for Candidates for the present or future Examinations, and are illustrated by take-to-pieces models, large diagrams, photographs, and specimens of materials.
Lectures commence at 7.30 p.m.
ENTRY FORMS for the EXAMINATION, TICKETS for the LECTURES, and ALL PARTICULARS can be had from S. W. PRESTON, Esq.
Carpenters' Hall, London Wall.

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UNIVERSITY EXTENSION LECTURES.
A COURSE OF 25 LECTURES ON "ARCHITECTURE," specially considering the merits of the different styles and the suggestions they afford for design, will be given by
BANISTER FLETCHER, A.R.I.B.A.
Late Lecturer on Architecture at King's College, London.
The Lectures will be followed by Sketching Classes from the Lecturer's Diagrams.
The First Lecture is on MONDAY, OCTOBER 7th, at SEVEN p.m.
Fee for the Course, 10*s.*
For Syllabus, apply to the SECRETARY. A detailed Syllabus (price 3*d.*) can also be obtained.

SURVEYORS' INSTITUTION EXAMINATIONS.
COMPLETE COURSES of PREPARATION for these Examinations are given, either in class, by correspondence, or in office, by Mr. RICHARD PARRY, F.S.I. A.M.Inst.C.E. &c. Candidates can arrange to commence study at any time. The following table shows the prizes that have been obtained by Mr. PARRY'S pupils at the last seven Examinations:—

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Institution Prize .. | 1895 | 1896 | 1897 | 1898 | 1899 | — | 1901 |
| Special Prize .. .. | — | — | 1897 | 1898 | 1899 | — | 1901 |
| Driver Prize .. .. | 1895 | 1896 | — | 1898 | 1899 | 1900 | 1901 |
| Penfold Silver Medal | 1895 | 1896 | — | 1898 | 1899 | 1900 | 1901 |
| Penfold Gold Medal | — | — | — | — | 1899 | 1900 | — |
| Crawter Prize .. .. | — | — | — | 1898 | — | — | 1901 |

NOTE.—In 1898 the Crawter Prize was divided between two bracketted winners, one of whom was prepared by Mr. PARRY.
The above table shows that of the 42 prizes awarded at the last seven Examinations, 25½ were obtained by candidates prepared by Mr. PARRY, and 16½ by candidates not prepared by him.
For particulars of the Courses of Work, or for any advice with respect to the Examinations, apply to Mr. RICHARD PARRY, F.S.I.A.M.I.C.E. 82, Victoria-street, Westminster. Telephone 680 Westminster

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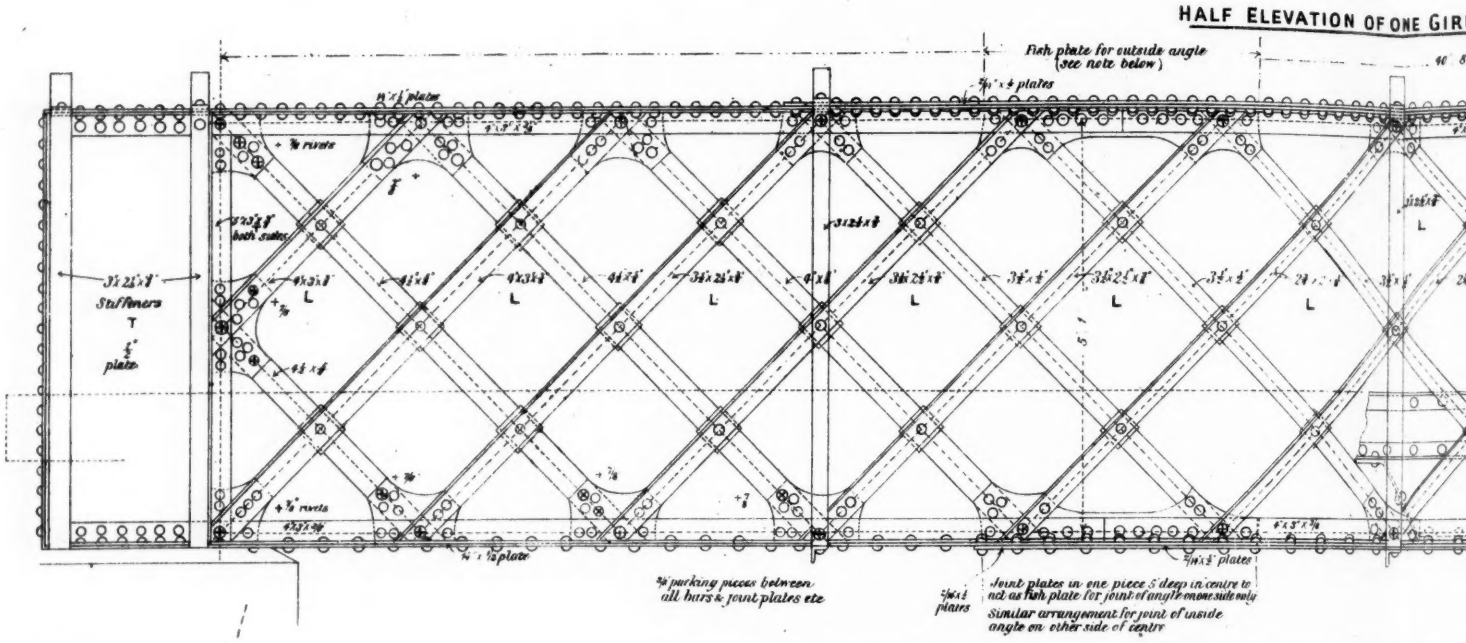
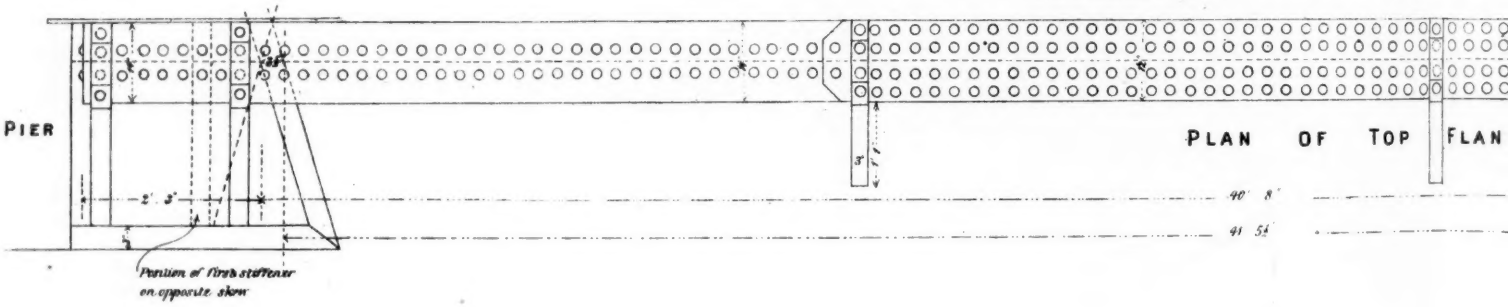
# COUNTY OF SOUTH

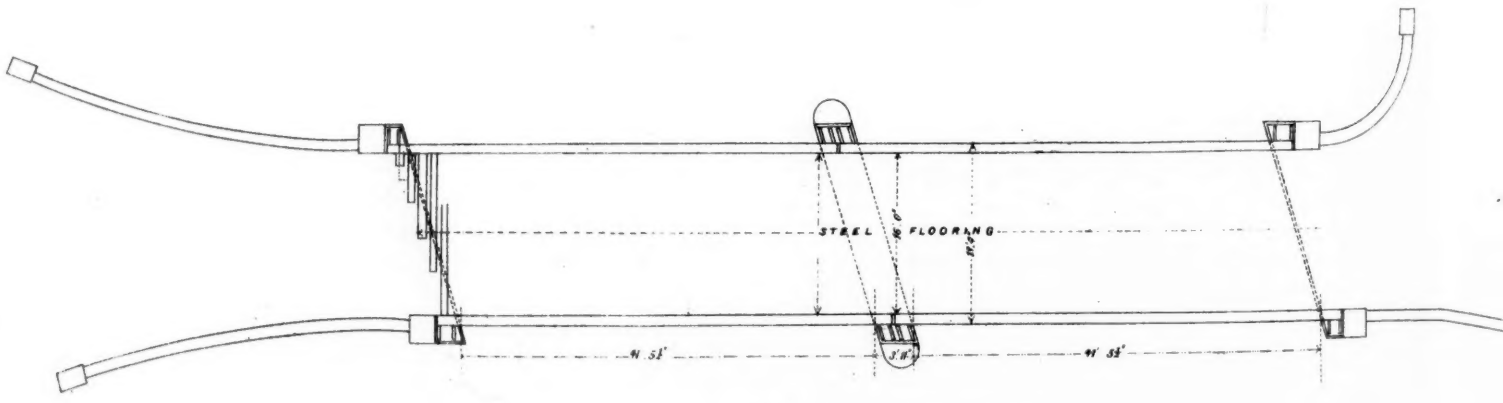
# BREAMORE GREA

## PROPOSED RECONSTRU

HALF ELEVATION OF ONE GIR


Fish plate for outside angle (see note below)
¾"x4 plates
¾" rivets
Both sides
Stiffeners
T
plate
¾" parking pieces between all bars & joint plates etc
Joint plates in one piece 5 deep in centre to act as fish plate for joint of angle one side only
Similar arrangement for joint of inside angle on other side of centre
plate




PLAN OF NEW BRIDGE

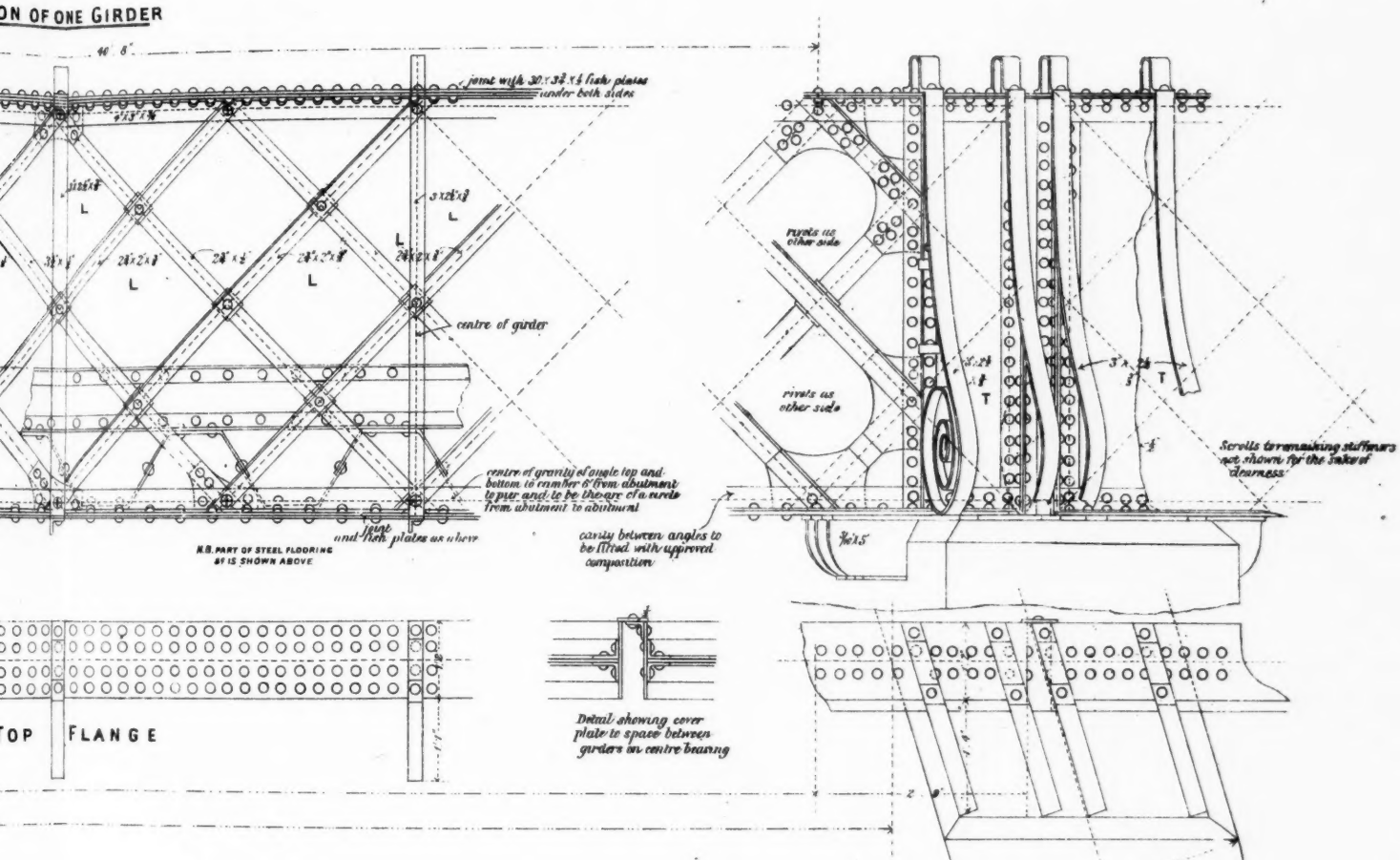
SCALE

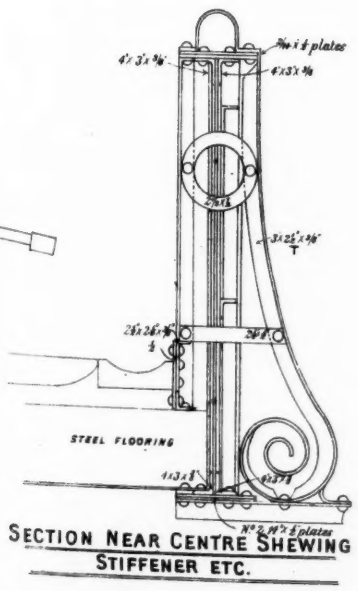
0 10 20 Feet

# SOUTHAMPTON
# REAT BRIDGE

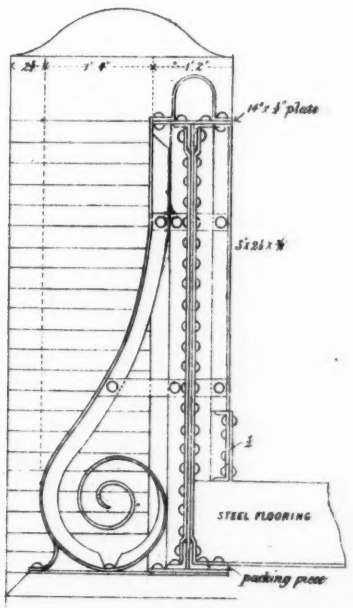
## ECONSTRUCTION

ON OF ONE GIRDER

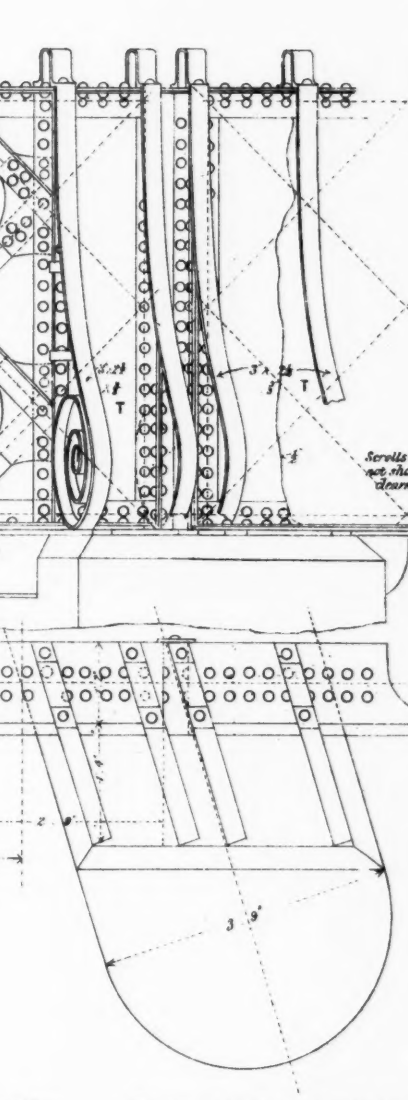

joint with 30 x 3½ x ½ fish plates under both sides
centre of girder
centre of gravity of angle top and bottom to number 6 from abutment to pier and to be the arc of a circle from abutment to abutment
joint and fish plates as above
N.B. PART OF STEEL FLOORING AS IS SHOWN ABOVE
cavity between angles to be filled with approved composition
rivets as other side
rivets as other side
Scrolls to remain but stiffners not shown for the sake of clearness
TOP FLANGE
Detail showing cover plate to space between girders on centre bearing




SECTION NEAR CENTRE SHEWING STIFFENER ETC.




SECTION SHEWING STIFFENER AT BEARING
DIAGONAL MEMBERS NOT SHEWN



PLAN AND ELEVATION OF DOWN STREAM CUTWATER AND GIRDER BEARING

W. J. Taylor
COUNTY SURVEYOR.
THE CASTLE,
WINCHESTER
October 1901

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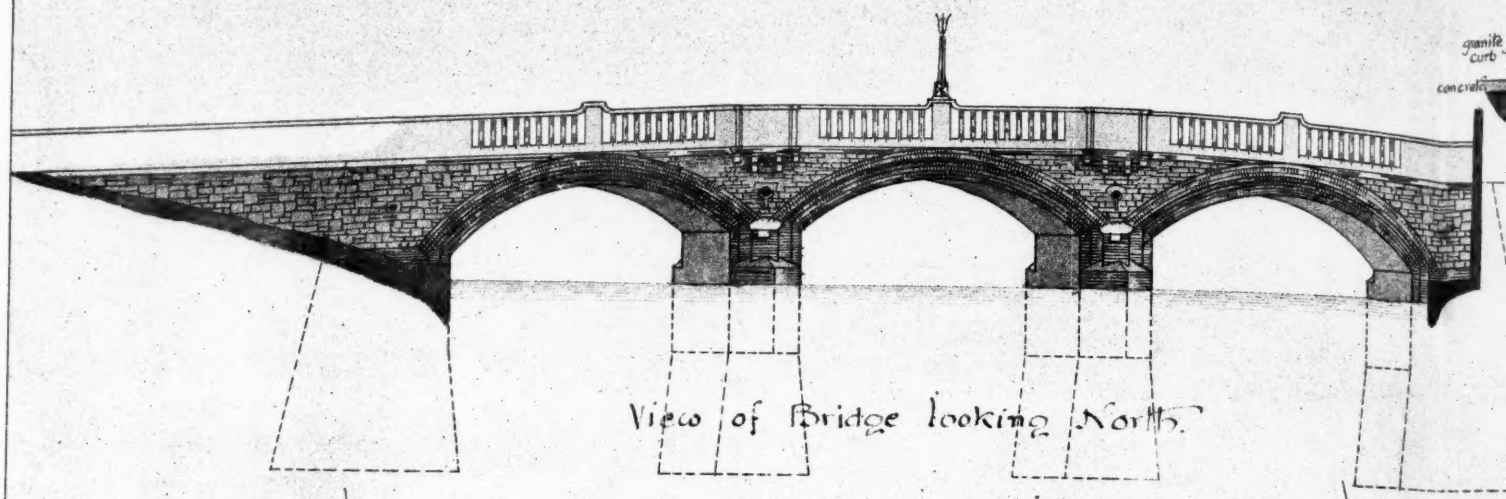
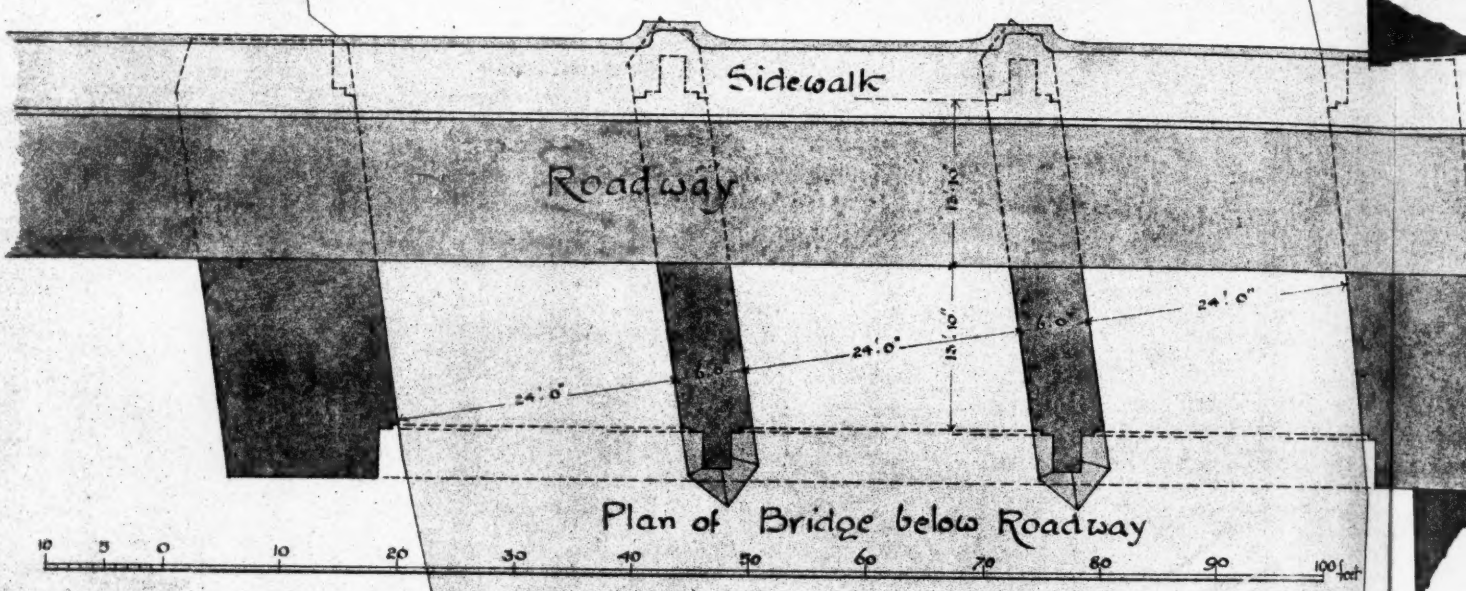
# New Bridge over the Wey at Guildford

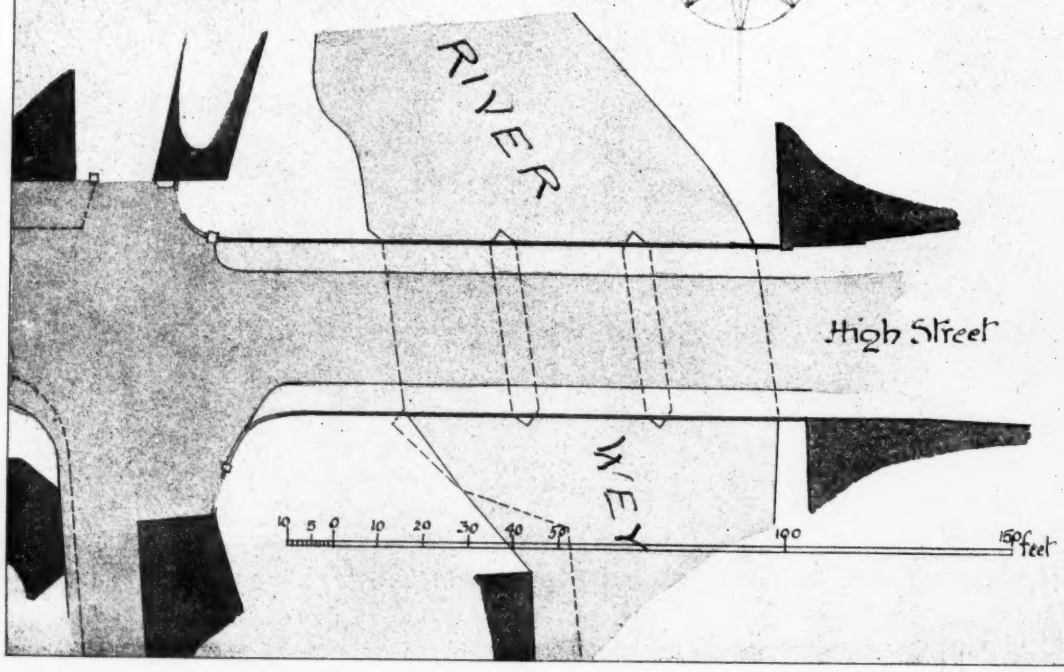



View of Bridge looking North.

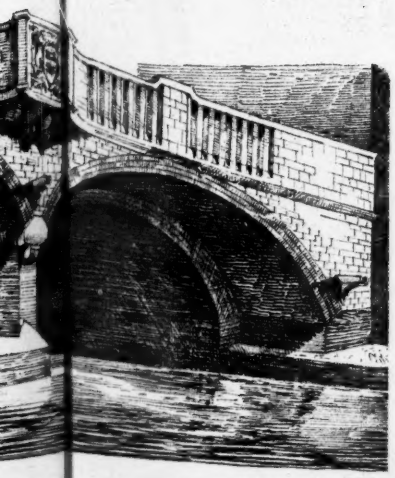



Plan of Bridge below Roadway

Site plan of Bridge



Portland stone coping
Box-ground stone
2½" paving
granite curb
concrete
Barge's stone
9'·0"
4'·6"
18'·0"
A
Box-ground stone
2½" paving
2½ paving
granite curb
level of crown of road
Road Metal
gravel filling
gravel filling
asphalte
drain
asphalte on concrete
drain
Concrete
layer of asphalte on top of concrete hogging
granite skewback
corbel
granite skewback
corbel
concrete
B
Section A·B
Concrete Pier faced with brickwork
½ chalk sheet pile
Bearing piles
Bearing piles 20 feet long
Bearing piles
Bed of River
Concrete Pier faced with brickwork
parapet over
parapet



Walter Ricardo
13 Bedford Square. London W.C.
December 5·1900.

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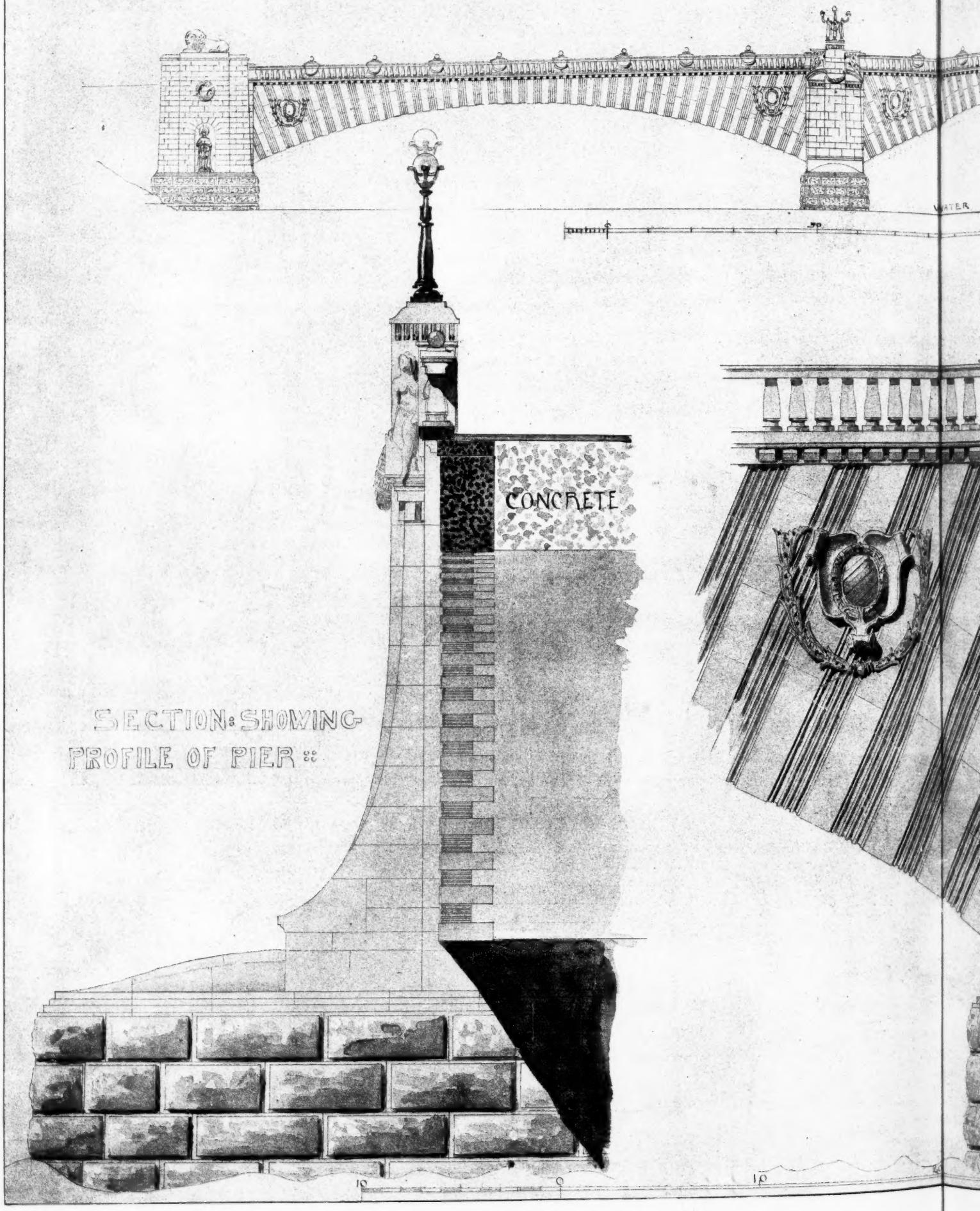


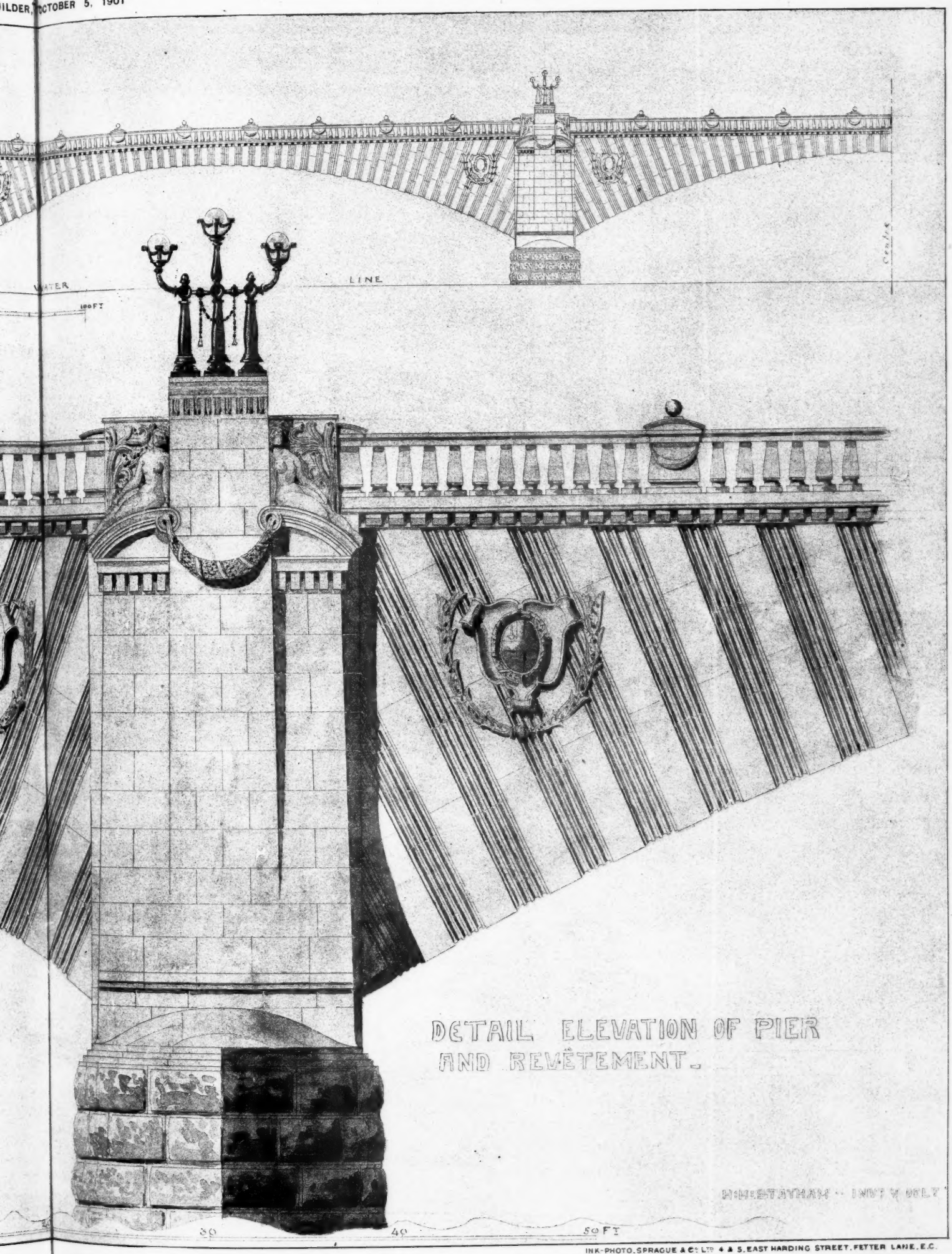

DESIGN FOR THE ARCHITECTURAL TREATMENT OF VAUXHALL BRIDGE, FOLLOW

By H. Heathcote Statham,

HALF ELEVATION AND D

GE[illegible]RARY,
UN[illegible]CH.
OCT 16 1901



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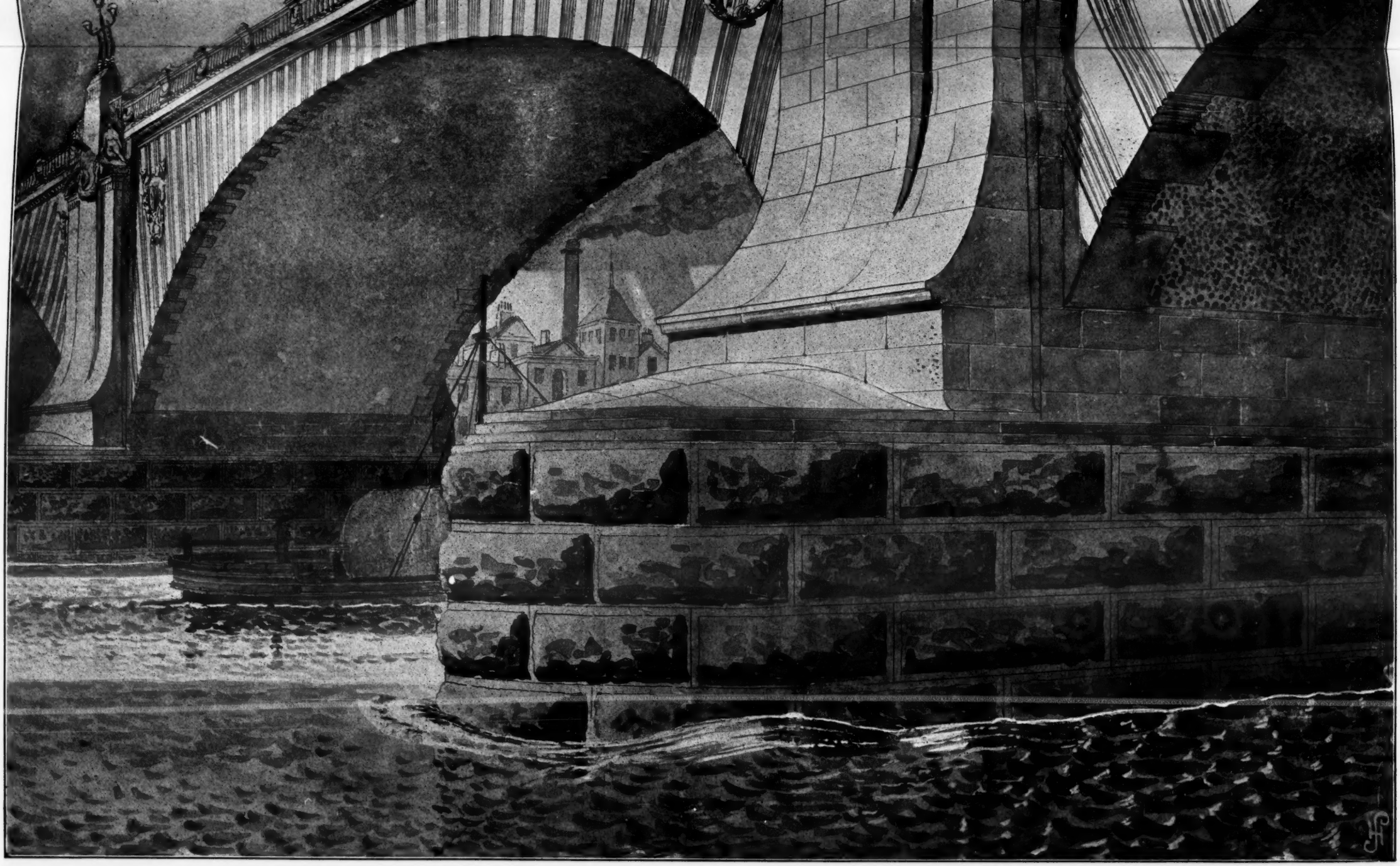
RIDGE, OLLOWING THE CONSTRUCTIONAL LINES OF THE ENGINEER'S DESIGN.
ATHCOTE STATHAM, F.R.I.B.A.

ELEVATION AND DETAILS.



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DESIGN FOR THE ARCHITECTURAL TREATMENT OF VAUXHALL BRIDGE, FOLLOWING THE CONSTRUCTIONAL LINES OF THE ENGINEER'S DESIGN.

By H. Heathcote Statham, F.R.I.B.A.

PERSPECTIVE VIEW.